Journal & Service Notes

OLYMPUS OM2-S PROGRAM

JULY/AUGUST 1988

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All service articles in this issue were prepared by Larry Lyells unless noted.

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OLMPUS OM2-S PROGRAM

Batteries: 2ea S76 (positive ground)

Similar models: other cameras in OM series (mechanically similar)

Fig. 1 -- top cover removed
Fig. 2 -- front view leather and front mirror-box light trap removed
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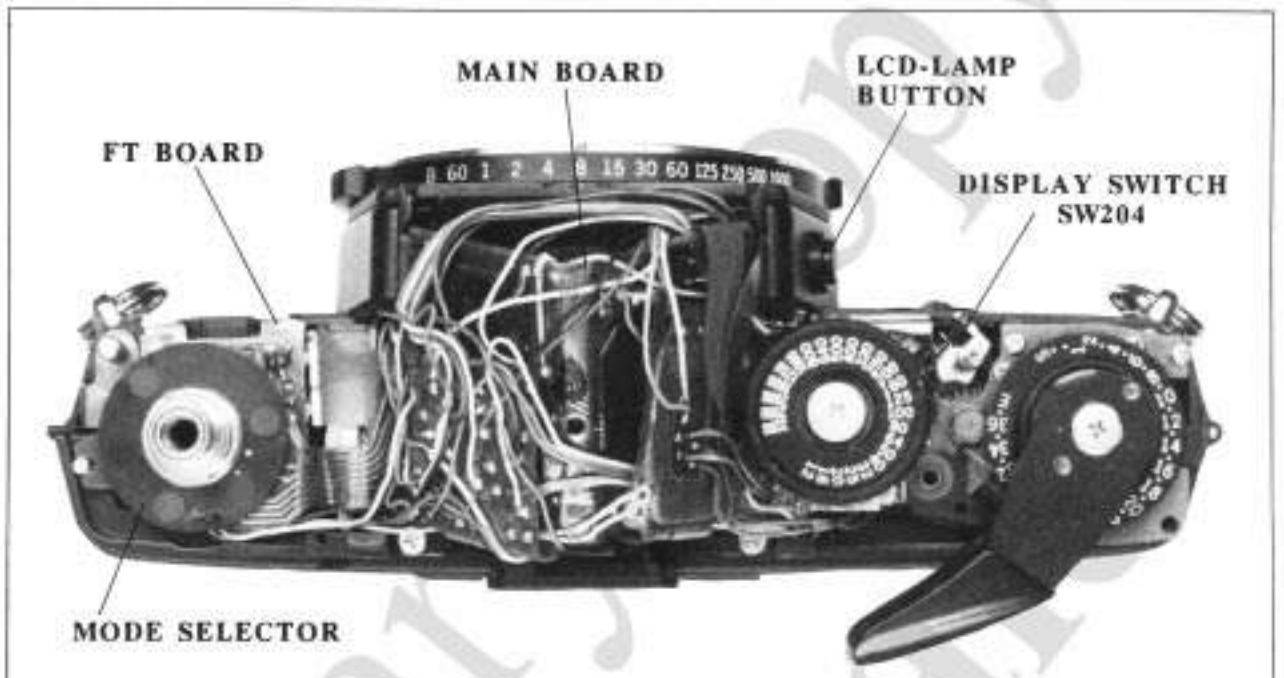

FIGURE 1 - TOP COVER REMOVED

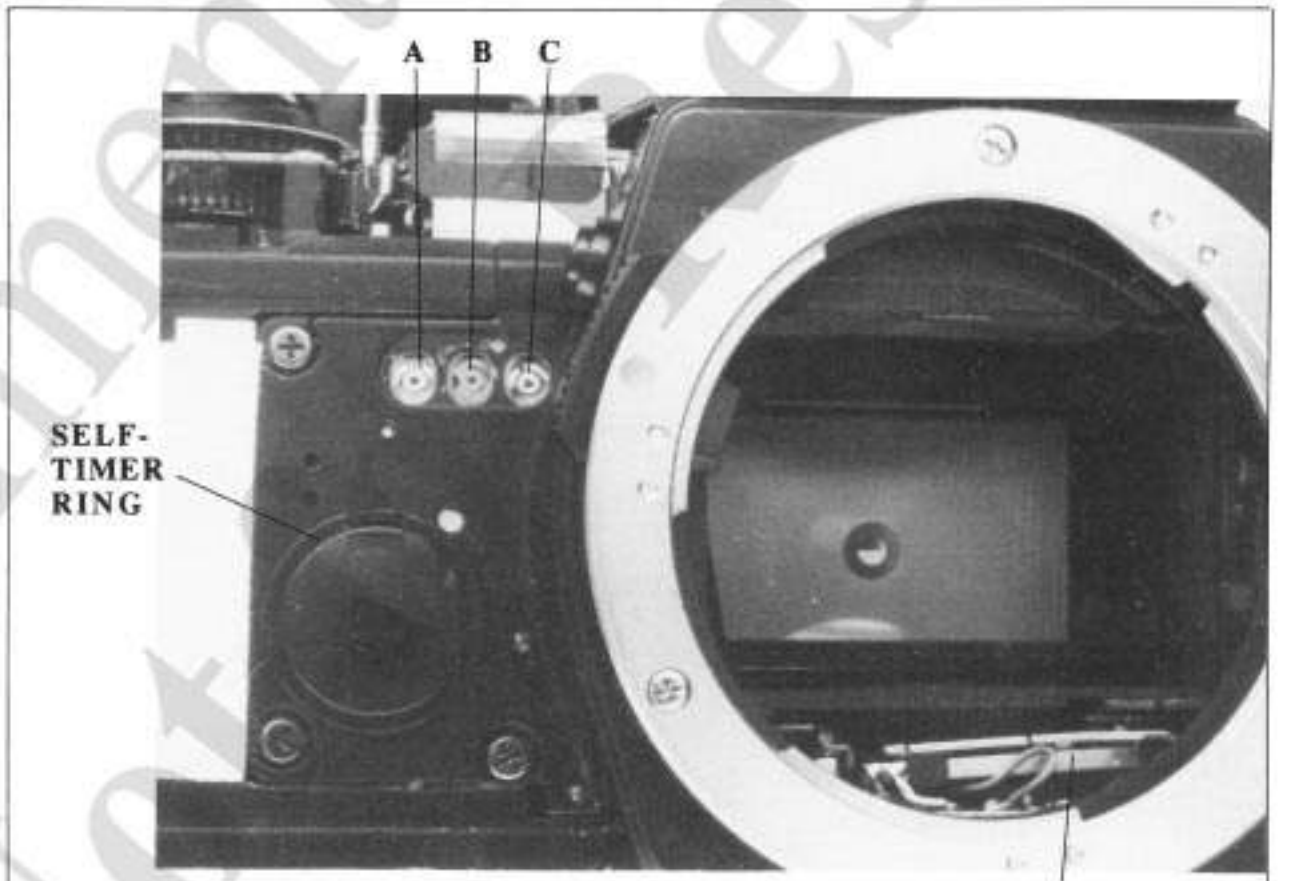

FIGURE 2 - FRONT VIEW

ADJUSTMENT LOCATIONS

Trigger voltage (1/1000)	A
Auto exposure	B
LCD readout, auto	C
CLCD readout, manual	D
Standard current (Iref)	E*
AV/TV voltage	F*
Digital-to-analog voltage (DAC)	G*
Reference voltage (Vref)	H*
Mirror cam	I**
Submirror angle	J**
Reflex-mirror angle	K
Travel time, 2nd curtain	L
Travel time, 1st curtain	M
Amplifier gain	N*
1st-curtain brake	O
Position, 1st curtain	P
Position, 2nd curtain	Q

*normally not necessary to adjust -- preadjusted on new board
**normally do not disturb

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ADJUSTMENT VALUES

Curtain-travel time: 10.9ms (32mm distance)
Flange-focal distance: 46.20 +/- 0.02mm (flange to pressure-plate rails)
K-factor: 1.3
Release-lock voltage: 2.6 +0.05, -0V (below this voltage, the mirror locks up)
Vref: 1.78v +/- 10mv
Iref: 150 +/- 1.5mv
AV/TV voltage: 186.9 +/- 3mv
DAC: 195 +/- 4mv
Sprocket timing: lead edge of a sprocket tooth 21 +/- 0.5mm from lead edge of focal-plane aperture

ADJUSTMENT PROCEDURES

Note: With the top cover removed, set the mode using the letter symbols on the mode selector, Fig. 1; align the appropriate bar on the mode selector with the positioning screw. Set ISO 100 by aligning the square post on the film-speed selector with the detent, Fig. 4.

Sequence:

1. Trigger voltage

Set manual mode, 1/1000 second. Adjust for an accurate 1/1000 with A, Fig. 2 (ccw for a faster speed, cw for a slower speed).

2. Auto exposure

Note: For slow speeds, the camera reads the light reflected from the film. To simulate the film's reflectivity, place a piece of film or an 18% neutral-gray card on the face of the test-instrument probe.

Set auto mode, ISO 100, f/5.6, EV11. Adjust the exposure with B, Fig. 2 (ccw for a longer exposure, cw for a shorter exposure). Then check the exposure accuracy in the program mode (no separate adjustment).

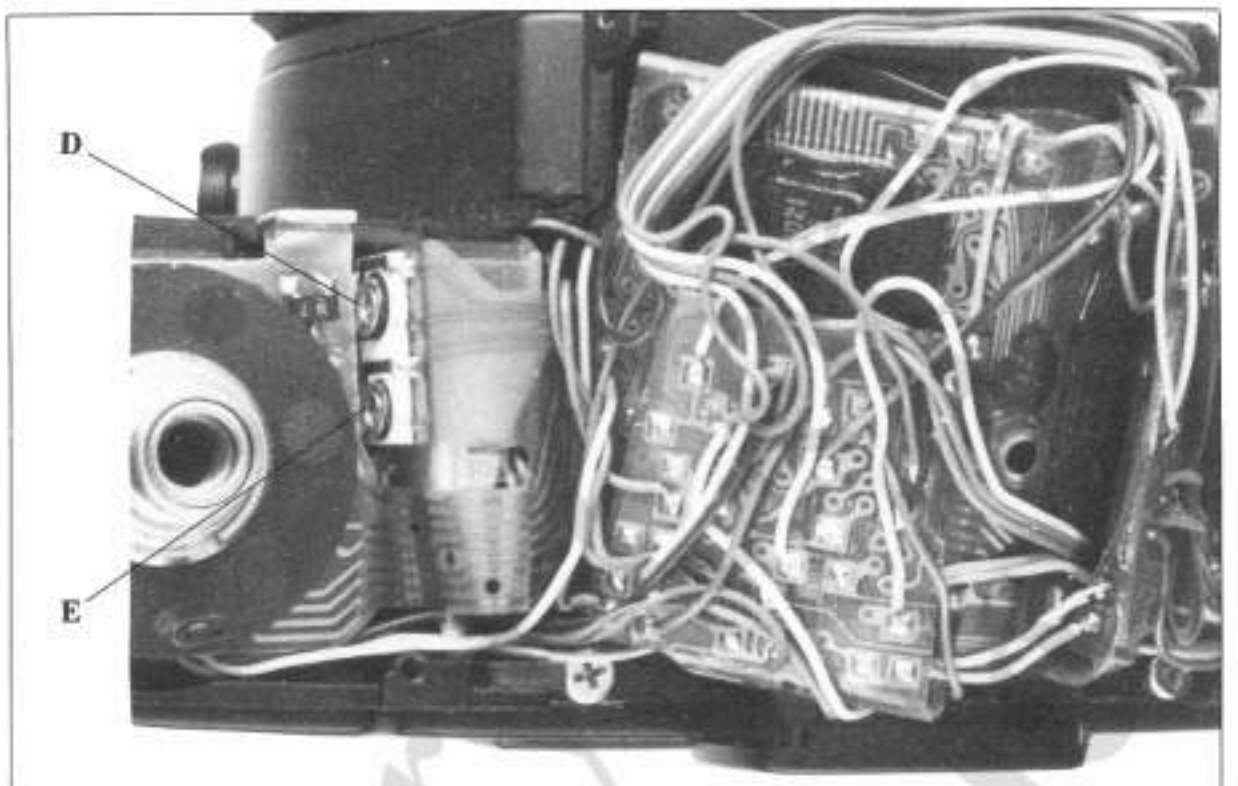

FIGURE 3 - TOP VIEW, REWIND SIDE

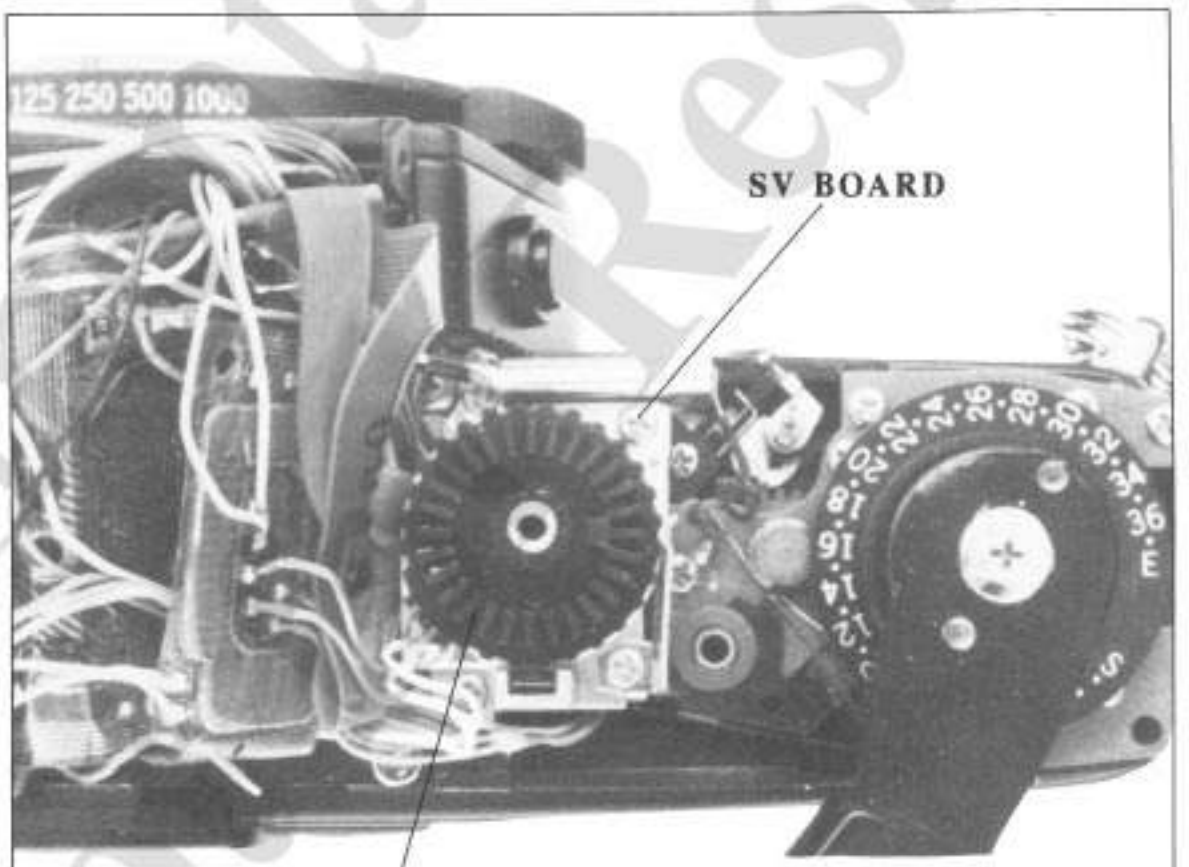

FIGURE 4 - TOP VIEW, WIND SIDE

3. LCD readout, auto

Set auto mode, ISO 100, f/5.6, EV11. Adjust C, Fig. 2, until the LCD reads 1/60.

4. LCD readout, manual

Set manual mode, ISO 100, 1/60, f/5.6, EV11. Adjust D, Fig. 3, until the LCD indicates proper exposure (bar aligns with center line).

ADJUSTMENTS NOT NORMALLY REQUIRED

Note: The standard voltage and current values are preadjusted on a replacement main board. Check if you're unable to adjust the auto exposure, if the manual speeds don't agree with the settings, or if you can't adjust the LCD indications. To adjust, unsolder the wires from the main-board

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flap, Fig. 3. Unfold the flex to reach the variable resistors, Fig. 7. You can check and make the adjustments with the wires disconnected.

Procedures:

1. Connect a 3V power supply between the V-bat land (black wire, Fig. 22) and body ground (+).

2. Before each measurement, turn the power supply off and then on to reset the circuit. Or, if the mode selector is still installed, Fig. 1, momentarily set the battery-test position. As you move the mode selector to battery test, the reset switch closes.

Sequence:

1. Reference voltage (Vref)

a. settings -- ISO 100, Fig. 4
b. test points -- Vref TP, Fig. 7 or Fig. 22, to the negative side of the power supply
c. value -- 1.78V
d. tolerance -- +/- 10mv

2. Standard current (Iref)

a. settings -- ISO 3200 (SV selector, Fig. 4, fully clockwise)
b. test points -- SV (orange) to SV-IN (yellow) on main board, Fig. 22
c. value -- 150mv
d. tolerance -- +/- 1.5mv

3. AV/TV voltage

a. settings -- ISO 100, Fig. 4
b. test points -- Vref (-) to AV/TV-OUT, Fig. 22
c. value -- 186.9mv
d. tolerance -- +/- 3mv

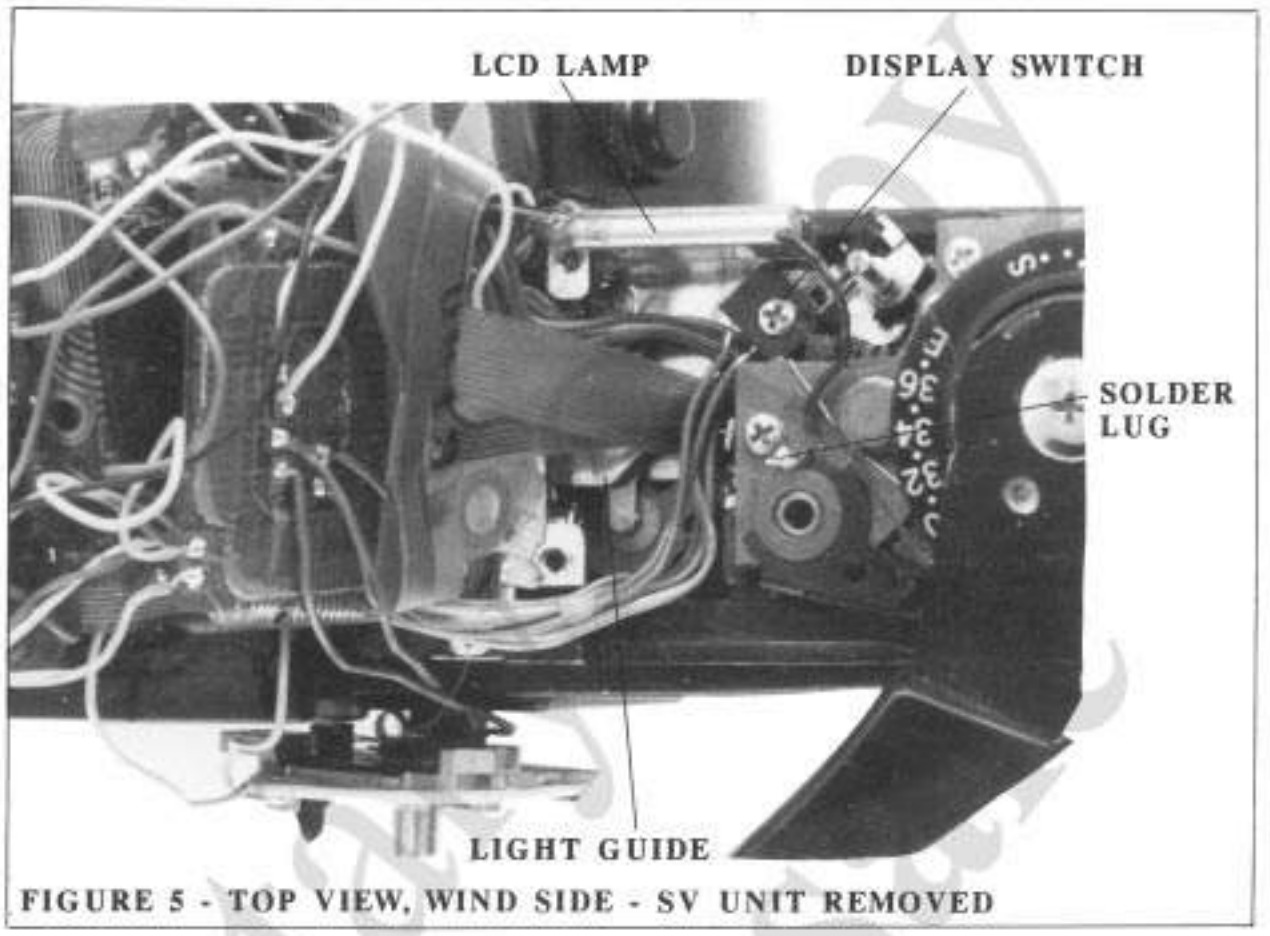

FIGURE 5 - TOP VIEW, WIND SIDE - SV UNIT REMOVED

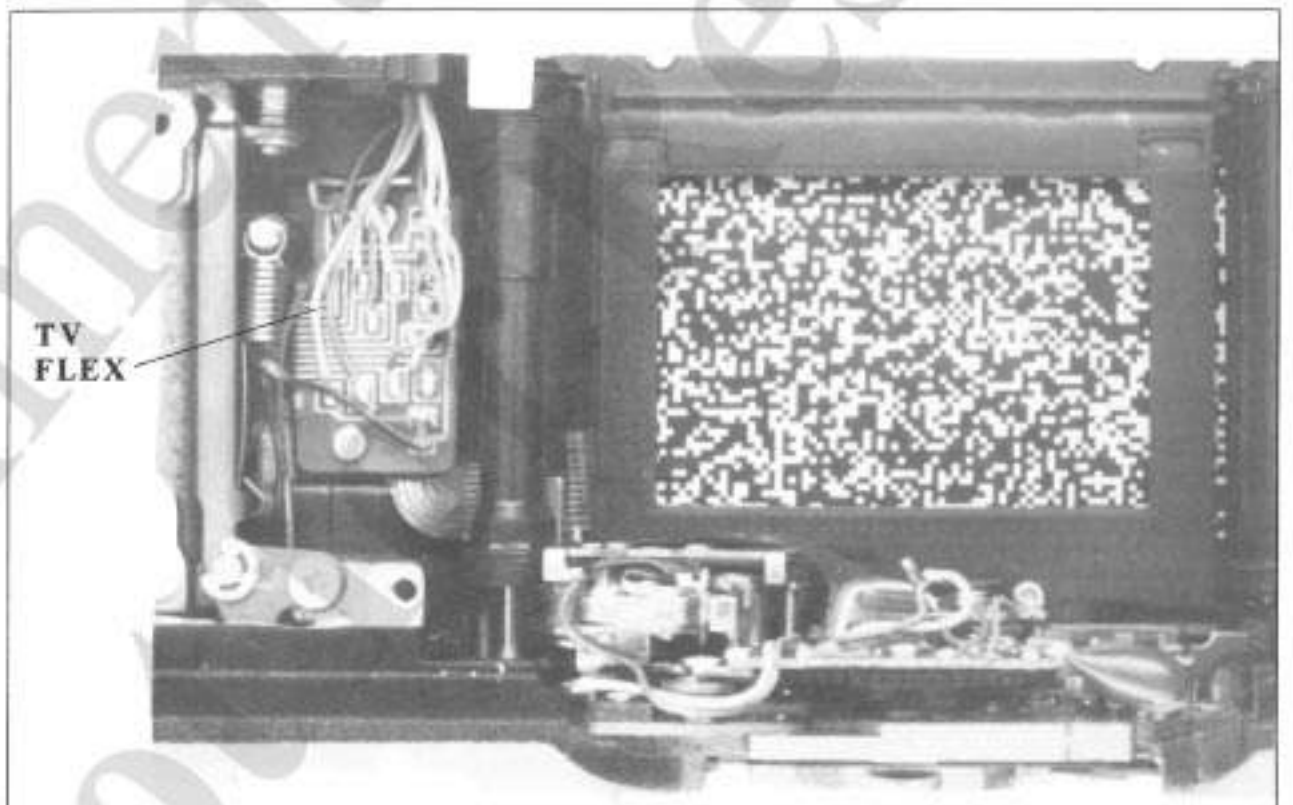

FIGURE 6 - FRONT VIEW, MIRROR BOX REMOVED

TIMING OF SHUTTER CURTAINS

1. Adjust the curtain positions with the shutter block removed, Fig. 20.
2. Push the armature of the shutter magnet against the core, Fig. 19. The second-curtain latch now moves into position to latch the 2nd curtain.
3. Wind on the 2nd curtain until the second-curtain gear is held by the second-curtain latch (charged position). The lead edge of the 2nd curtain should now be 0.2mm from the corner of the curtain frame, Fig. 20. For fine adjustment of the curtain position, use the adjusting plate (Q in Fig. 19). To change the gear timing, remove the spring plate from the bottom of the shutter block (over the lower pivots of the winding rollers). Then push down the second-curtain roller to disengage its pinion from the second-curtain gear. Turn the second-curtain roller to change the timing.
4. Wind on the 1st curtain until the first-curtain gear is held by the first-curtain latch. The left-hand edge of the first-curtain bar should now be 0.2mm from

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the corner of the curtain frame, Fig. 20 (1-bar overlap).
5. For a fine adjustment of the curtain position, use the adjusting plate (P in Fig. 19). To change the gear timing, slightly push down the first-curtain roller while lifting up the first-curtain gear. Once the pinion and gear disengage, turn the first-curtain roller to position the bar.

OPERATING INSTRUCTIONS

1. The finder LCD turns on when you depress the release button part way. The LCD remains on 2 minutes.

2. Set the mode with the mode selector under the rewind knob. In the program mode, the "prgm" LCD turns on at the top of the display. The bar LCDs show the shutter speed that the camera will automatically select. Set the smallest f/stop for a full range of apertures. If you don't set the smallest f/stop, the camera will still provide the proper exposure. However, if the aperture is too large for proper exposure, the "over" LCD flickers at the top of the display and the piezo beeps. Also, the iris-symbol LCD flickers, showing which way to turn the diaphragm-setting ring. Metering on program mode is center-weighted.

3. Set the A mode for "aperture-preferred" control. The "prgm" LCD turns off, but the bar LCDs still show the shutter speed that will be automatically set. If the aperture is too large for proper exposure, the "over" LCD flickers and the piezo beeps. Metering is center-weighted.

4. In the M (manual) mode, the speeds are controlled by the setting on the shutter-speed setting ring. The

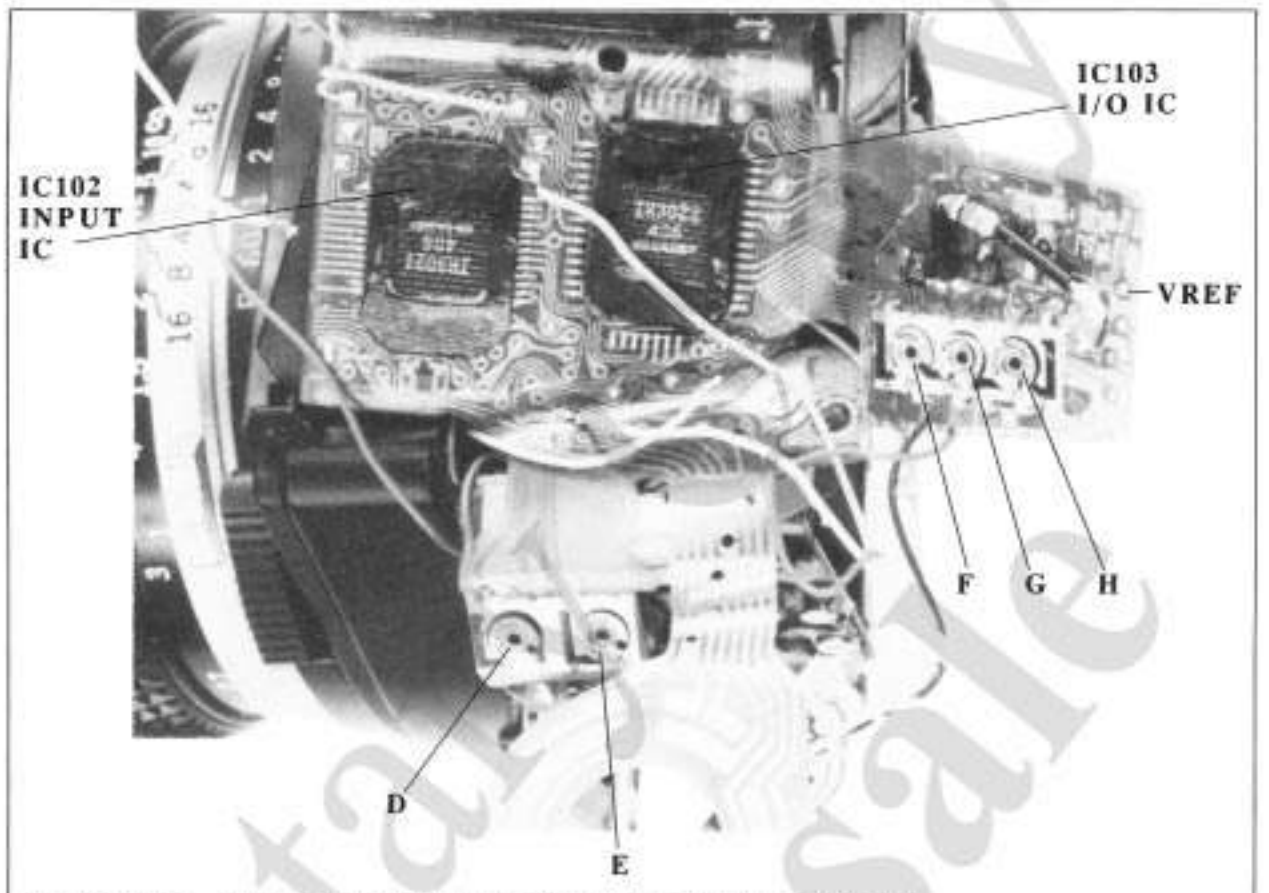

FIGURE 7 - TOP VIEW OF MIRROR BOX, REWIND SIDE

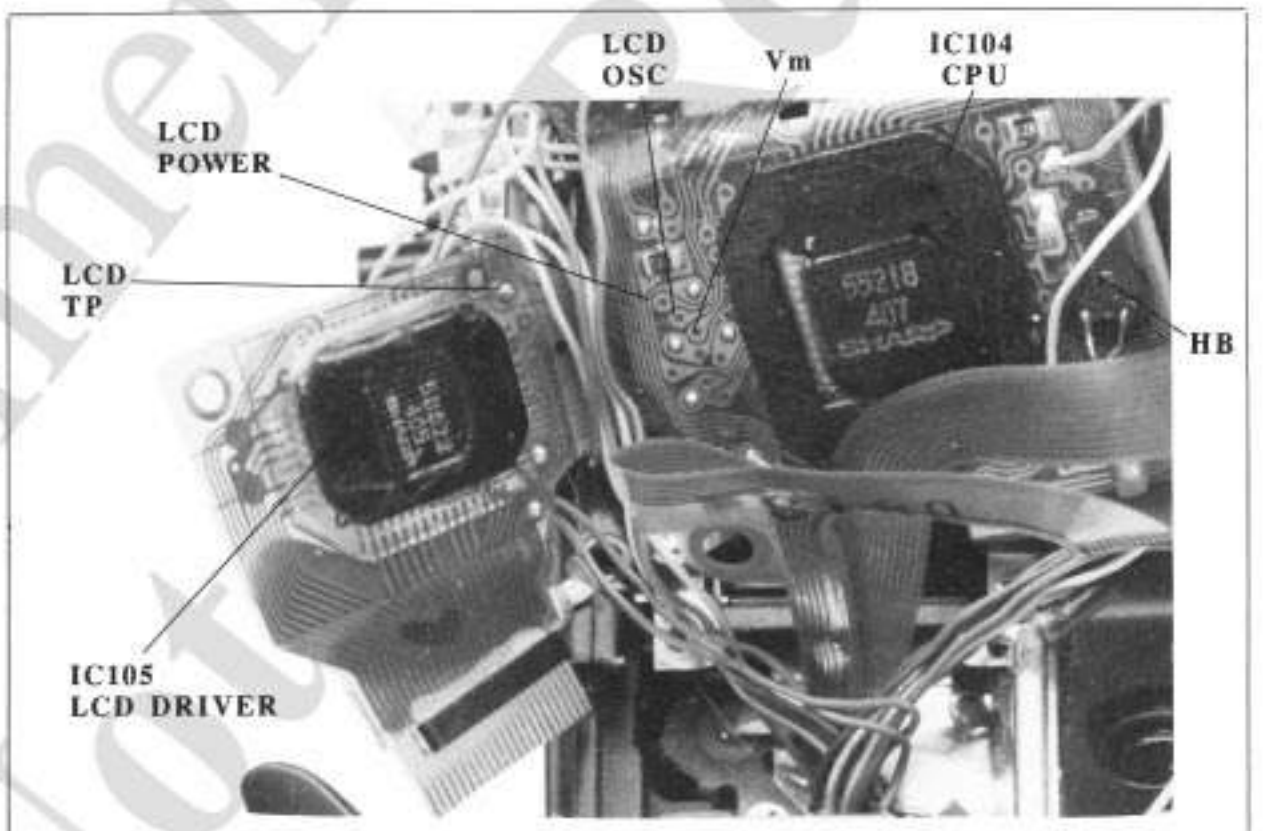

FIGURE 8 - TOP VIEW OF MIRROR BOX, WIND SIDE

camera selects spot metering (the metering area is restricted to the microprism spot on the focusing screen). At manual, the LCD gives a center-the-needle pattern. When the bar pattern aligns with the pointer, the controls are set for proper exposure.

5. Shutter speeds of 1 - 1/1000 are electronically controlled. Without batteries, the mirror locks up (moves to the raised position without releasing the shutter). To return the mirror, install fresh batteries or set a mechanical speed (1/60 or bulb -- marked in red on the shutter-speed ring). To set the mechanical speeds, depress the "lock" tab on the front corner of the lens mount and turn the shutter-speed ring. The camera will operate at the red settings without batteries.

6. To set the self-timer, lift

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the tab on the self-timer ring, Fig. 2. Then turn the ring counterclockwise. When you push the release button, the mirror moves to the raised position without releasing the shutter. The self LED flickers and the piezo beeps during the 12-second delay. The frequency of the LED/piezo oscillator increases around 2 seconds before the shutter releases.

7. When you turn the film-speed dial to an exposure-compensation setting, the +- LCD flickers (bottom of LCD row).

8. Turn the self-timer knob in a clockwise direction to turn off the piezo buzzer.

9. With the mode selector in the battery-test position, the piezo beeps and the self-LED glows to indicate good batteries.

10. The button on the wind side of the lens mount turns on the LCD lamp to illuminate the LCD. The lamp stays on 10 seconds after you let up the button. The LCD lamp doesn't turn on at the mechanical settings.

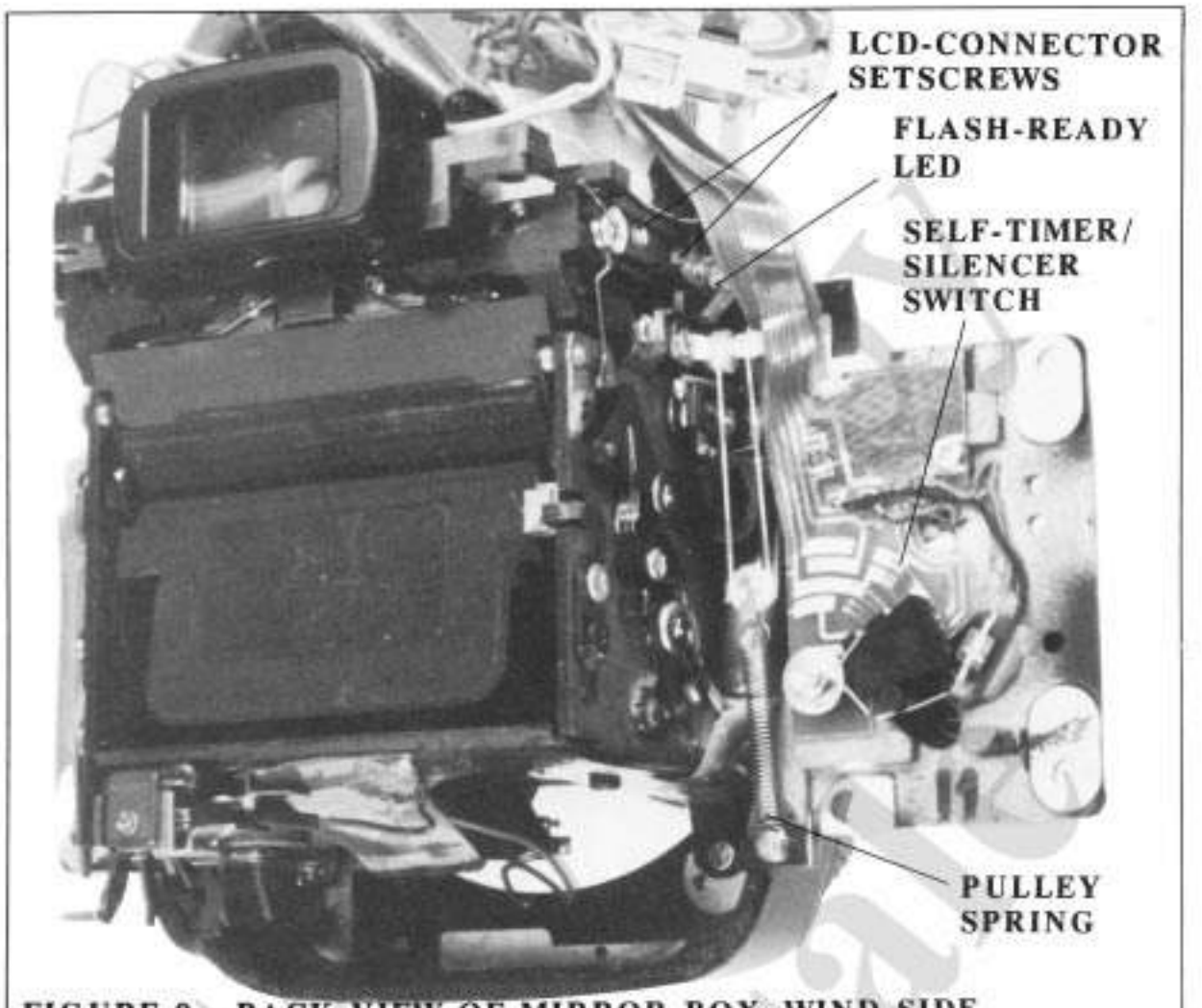

FIGURE 9 - BACK VIEW OF MIRROR BOX, WIND SIDE

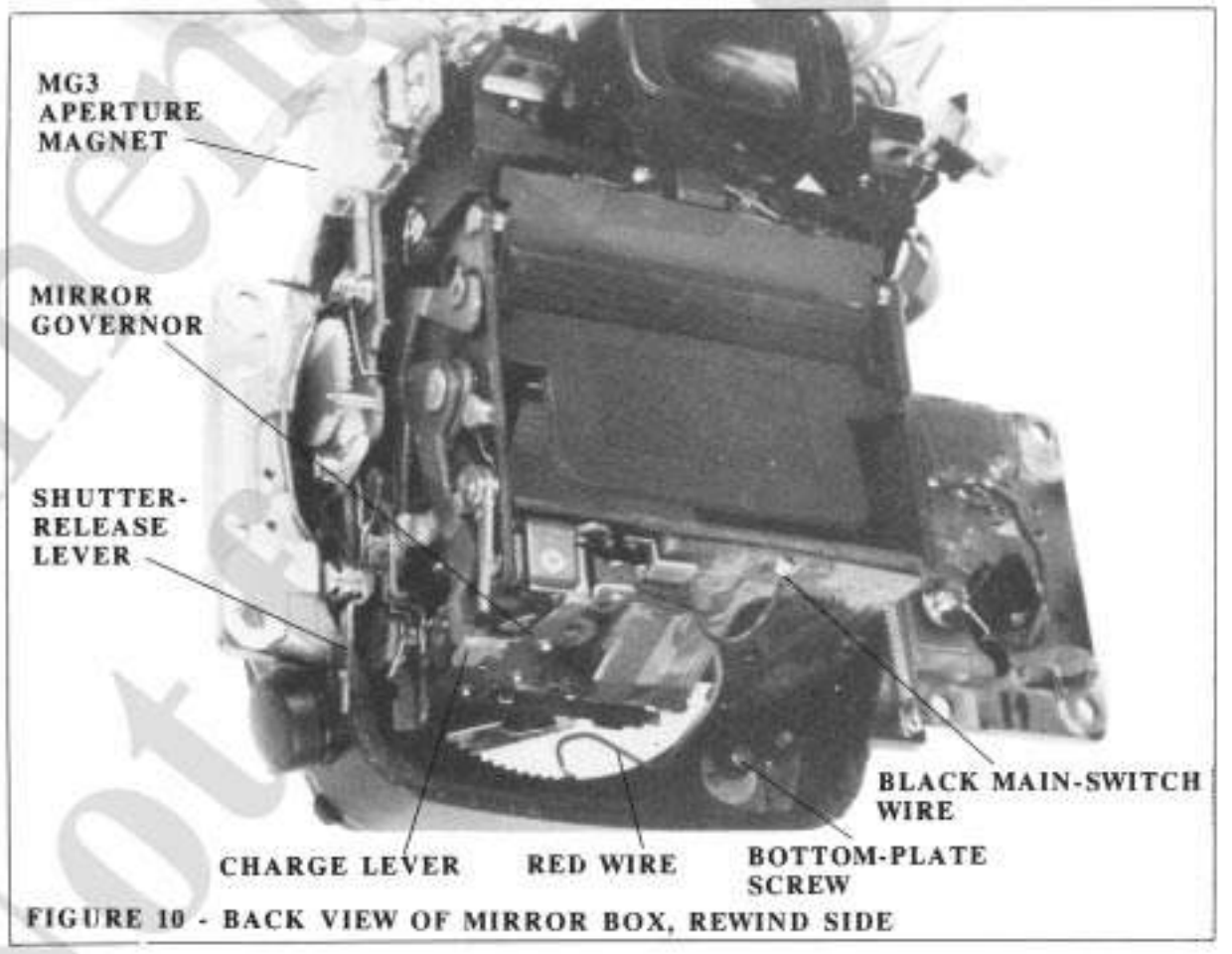

FIGURE 10 - BACK VIEW OF MIRROR BOX, REWIND SIDE

SWITCH LOCATIONS AND FUNCTIONS

1. SW101. Main switch, bottom of mirror box, Fig. 10. Closes with the mirror up to signal the release of the 1st curtain.

2. SW102. Trigger switch, bottom of camera connecting to TV board, Fig. 14. Opens when the 1st curtain starts to run to start the exposure cycle (start of integration).

3. SW103. X-sync contacts, bottom of camera connecting to TV board, Fig. 6. Closes when the 1st curtain crosses the aperture, switching pin 37 of the I/O IC to ground. Pin 36 of the I/O IC then switches on the SCR to fire the flash.

4. SW104. FP switch, side of mirror box, Fig. 9. Closes when the mirror rises, connecting the anode of the SCR to ground. The SCR can then switch on when it gets the gate signal.

5. SW105. Piezo (silencer) switch, back of front plate, Fig. 9. When SW105 is closed, the piezo buzzer connects to the I/O IC. Opening SW105 shuts off the piezo buzzer.

6. SW201. Self-timer switch, back of front plate, Fig. 9. When closed, SW201 connects CPU pins 20 to 26. The CPU then selects the self-timer mode when the main switch closes.

7. SW202. Exposure-compensation switch on underside of SV board, Fig. 5. Closes when the film-speed dial is set to an exposure-

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compensation setting. The CPU then provides the signal through the I/O IC that causes the +- LCD to flicker.

8. SW203. LCD-lamp switch, side of mirror box. Closes when you push the lamp button. The CPU then provides the signal through the I/O IC to turn on the LCD lamp.

9. SW204. Display switch by release plate, Fig. 1. Closes when you push the release plate part way. The I/O IC now turns on the LCD driver, and the CPU turns on the head amplifier. Signals from the CPU to the LCD driver determine which segments turn on.

10. SW205. Bulb switch at underside of TV gear, Fig. 11. Closed at the mechanical settings (bulb and 1/60). With SW205 closed, the CPU does not provide the signals to turn on the LCD and to energize the magnets. Operation is mechanical.

11. SW206. Mode switch, Fig. 1. Selects the mode (BC, A, M, or program) by connecting the proper CPU pin to the mode-select circuit at pin 19. With pin 19 open, the circuit selects program.

12. Reset switch. Contact on mode selector (next to BC contact). Turning the mode selector to the battery-test position first closes the reset switch to clear the circuit. The reset switch also cancels other circuit functions.

13. SW4. Motor switch, bottom front of mirror box, Fig. 2. With the mirror down, SW4 connects the blue-wire contact of the MD block to the white-wire contact. With the mirror up, SW4 connects the blue-wire contact to ground.

14. U.SW. Back-cover

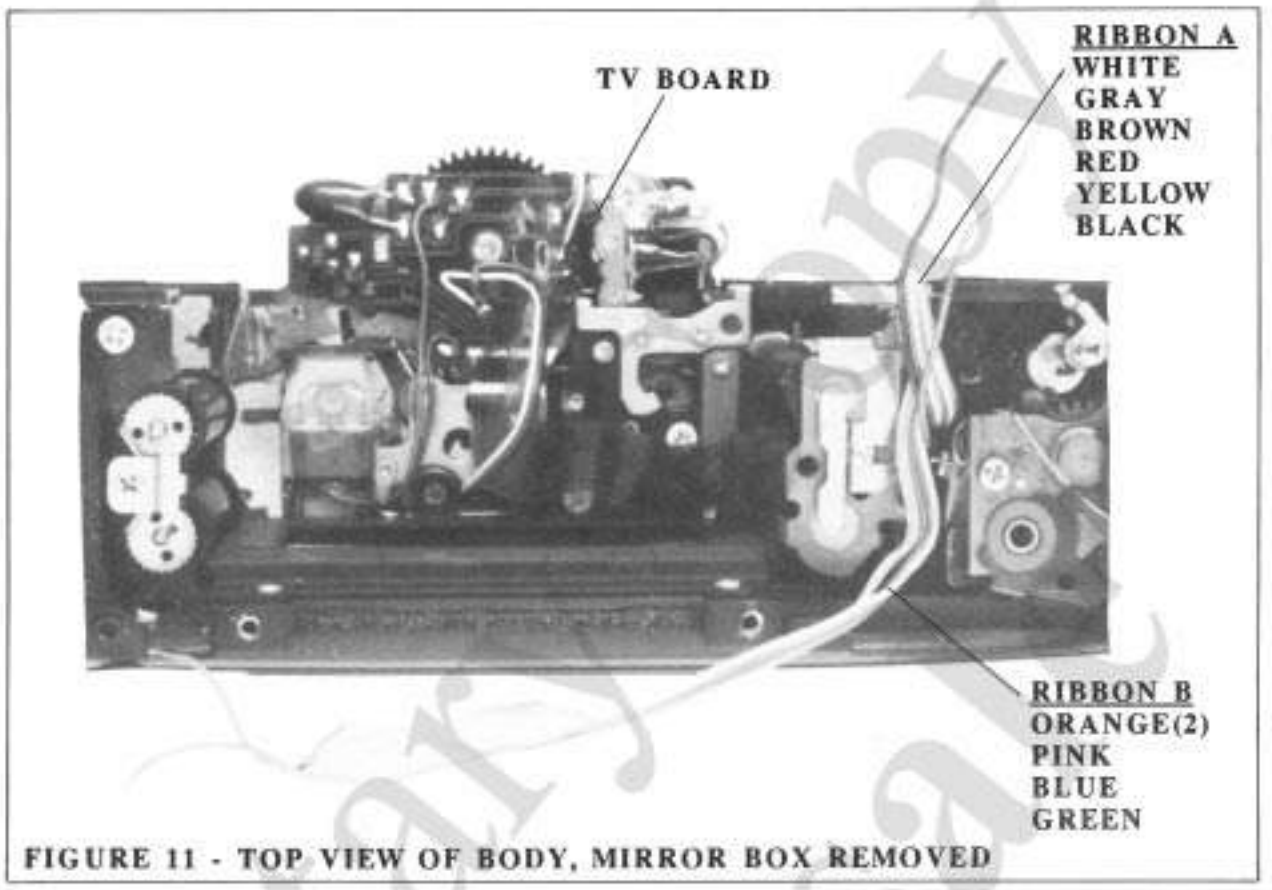

FIGURE 11 - TOP VIEW OF BODY, MIRROR BOX REMOVED

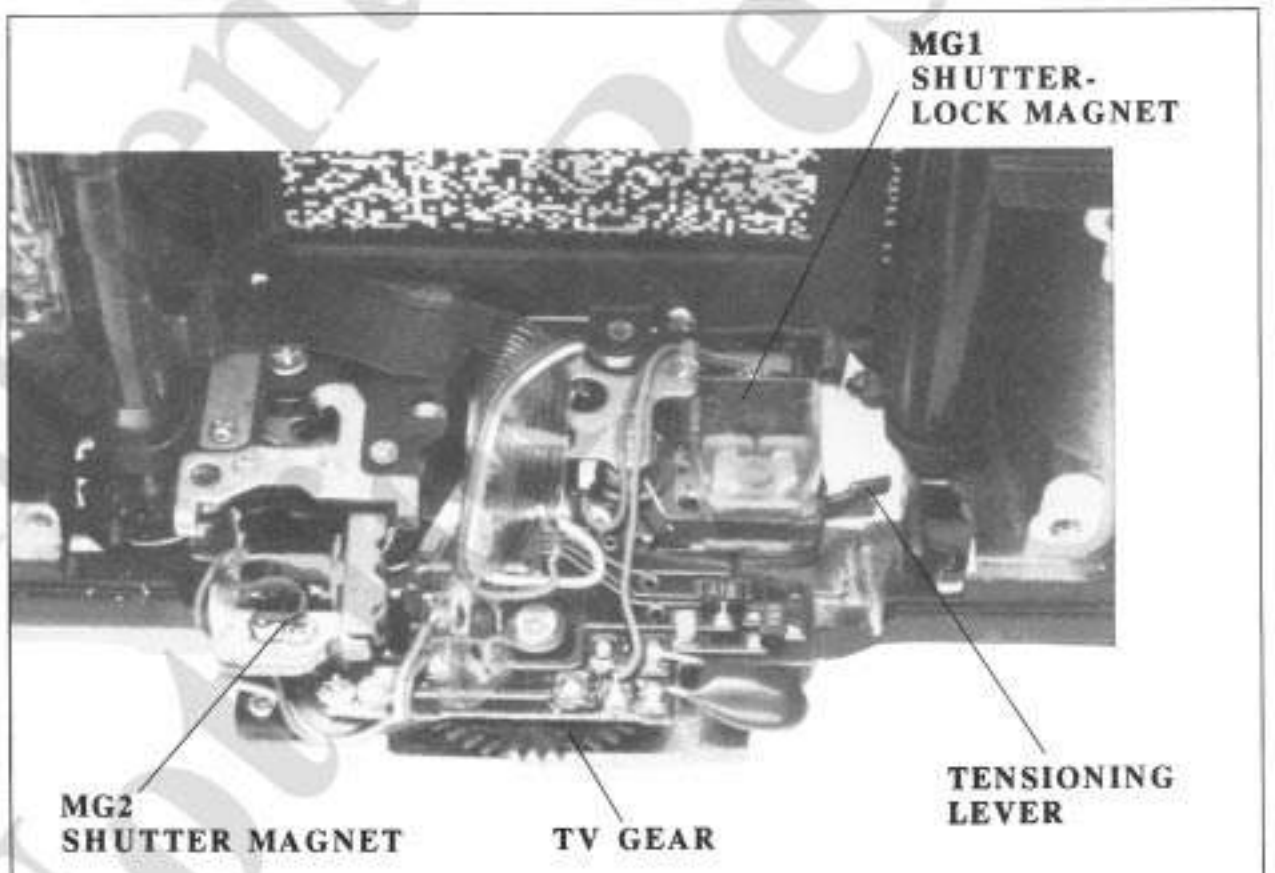

FIGURE 12 - TOP VIEW, TV BOARD

switch, bottom of camera, rewind side, Fig. 16. Closed with the back open, connecting the red-wire contact of the MD block to ground. Open with the back closed to disconnect the red-wire contact from ground.

LOCATIONS AND FUNCTIONS OF ICs

1. IC101. Head amplifier on main board at bottom of mirror box, Fig. 10 and Fig. 13. Has two built-in SPDs (average and spot, Fig. 13) for measuring the light passed through the mirror and reflected down by the submirror (indication). With the mirror up, IC101 measures the light from the 1st curtain (fast speeds) or from the film (slow speeds). IC101 provides two outputs -- BV OUT to IC102 for indication and INTEGRATION OUT to IC103 for exposure.

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2. IC102. Input IC on main board, top rewind side, Fig. 7. Receives the BV OUT signal from IC101 as well as the SV, TV, and AV values. An A-D converter in IC102 converts the analog signals to digital signals. The digital signals are supplied to the multiplexer in the CPU on a time-shared system.

3. IC103. Input/output IC, top of main board at rewind side, Fig. 7. Controls the magnets according to signals received from IC101 and IC104.

4. IC104. CPU, top of main board at wind side, Fig. 8. Includes the oscillator and the D-A converter. Provides the control signals to the I/O IC and the LCD signals to the LCD driver.

5. IC105. LCD driver, underside of board at top, wind side, Fig. 8. Controls the LCD segments according to signals received from the CPU. The I/O IC provides the signals that turn on the LCD driver.

LOCATIONS AND FUNCTIONS OF MAGNETS

1. MG1. Hybrid shutter-lock magnet on TV board, Fig. 12. Repels its armature to release the 1st curtain after the main switch closes.

2. MG2. Electromagnet for shutter-speed control on TV board, Fig. 12.

3. MG3. Hybrid aperture magnet, top rewind side of mirror box, Fig. 10. Repels its armature to stop the diaphragm on program mode.

BASIC CIRCUIT OPERATION

1. The 32KHz oscillator in the CPU turns on as soon as power is supplied. The 500KHz clock in the CPU now turns on and off to conserve power. Every 300ms, the clock turns on. If you're checking the clock on a scope, the signal appears to pulsate. When you close the display switch, the clock signal switches on every 100ms (on a scope, the trace appears steady). The LCD now turns on.

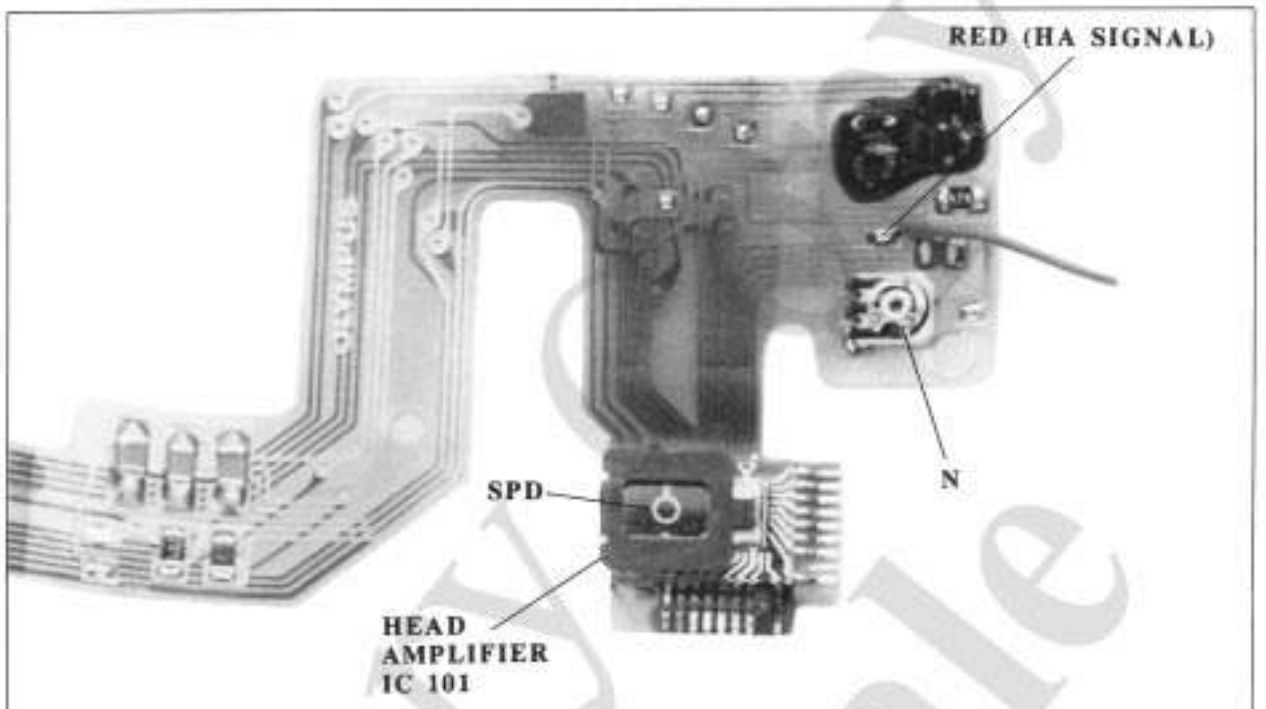

FIGURE 13 - BOTTOM SECTION OF MAIN BOARD REMOVED FROM MIRROR BOX

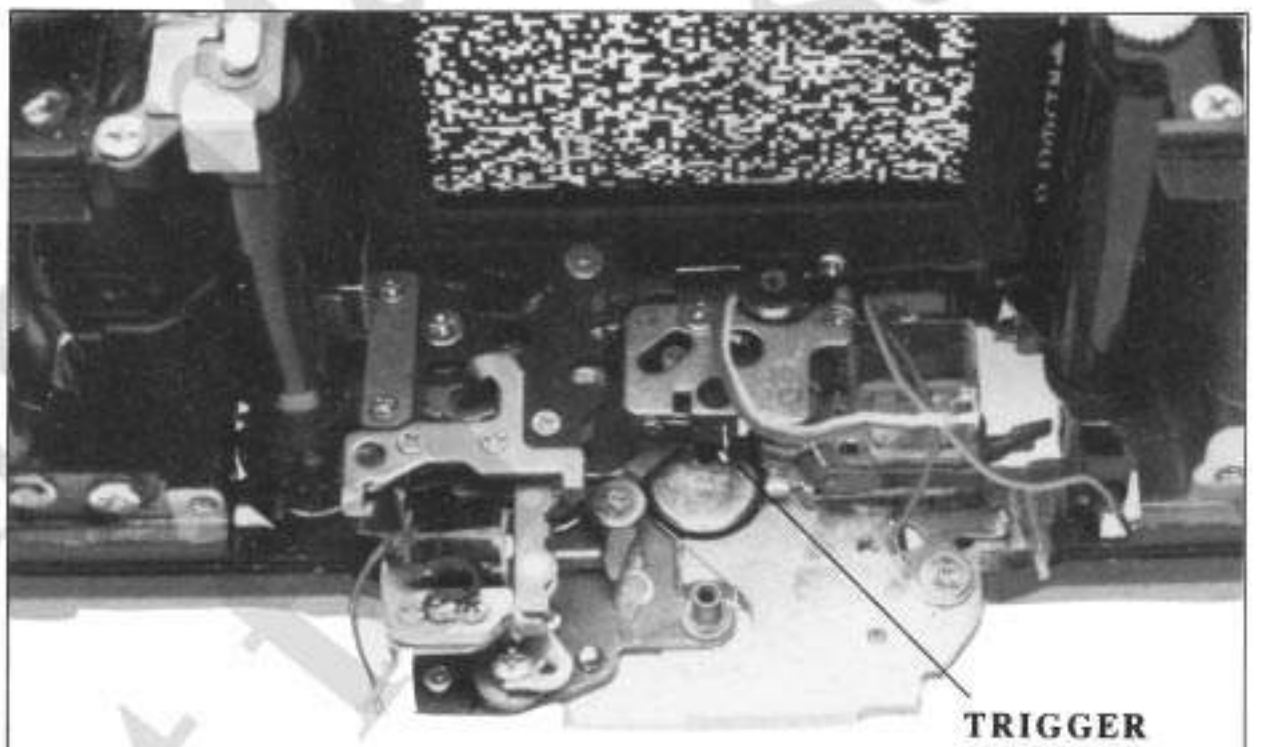

FIGURE 14 - FRONT VIEW, TV BOARD REMOVED

2. To turn on the LCDs, the CPU supplies the oscillator signal to the I/O IC (pin 52). The I/O IC then supplies the signals that turn on the LCD driver -- LCD power (low), LCD oscillator, and VM (1.2V), Fig. 23. The signals that control the LCD readout come from the CPU (LCD-signal bus, Fig. 23).

3. The CPU also supplies the signals that turn on the head amplifier IC101 -- the HA and HB signals, Fig. 23. When either signal is high, IC101 turns on and measures the light (through reflex mirror, off submirror, to SPD). The HA and HB signals (high or low) also de-

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termine the mode -- average or spot for indication, direct for exposure. The high HB signal also turns on the input IC (IC102).

4. AR1 in the head amplifier selects the integration capacitors C103 and C104 according to the film speed. With the shutter charged, the trigger switch closes. Pin 8 of the head amplifier switches low, closing the internal switch indicated at the output of AR1. For ISO speeds of 12 through 250, AR1 charges both capacitors. For ISO speeds of 320 through 3200, AR1 charges C103.

5. IC101 supplies the analog BV signal to IC102. IC102 converts the BV voltage to a digital signal. The A-D converter in IC102 also converts the TV, AV, and SV inputs to digital signals. All signals go to the multiplexer in the CPU on a time-shared system; the D/A-select circuit in the CPU selects which of the values is input to the multiplexer. The CPU stores the information in the RAM, Fig. 23. The RAM supplies the signals to the LCD driver. The LCD driver turns on when it receives the LCD power, LCD oscillator, and VM signals from the I/O IC, Fig. 23.

6. When you fully depress the release, the diaphragm starts closing. The BV signal now decreases as the SPD sees less light. On program mode, the CPU controls the diaphragm opening through the I/O IC. The D/A converter in the CPU converts the digital diaphragm signal to an analog voltage; the voltage provides the reference input to a comparator. The BV signal provides the second input. When the BV voltage drops below the reference voltage, the comparator output switches low. Pin 9 of the I/O IC now switches low, turning on Q101. C114 discharges through MG3 to stop the diaphragm.

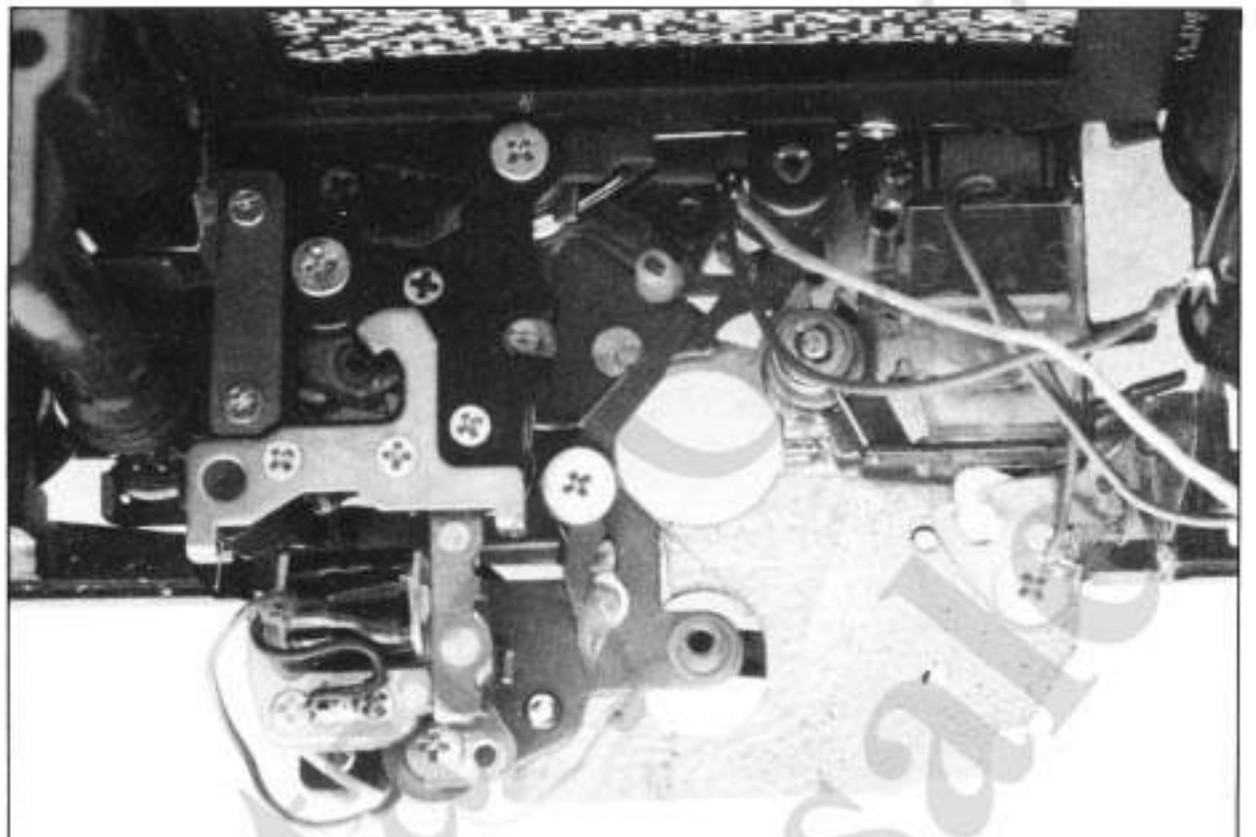

FIGURE 15 - FRONT VIEW, TV BOARD AND TRIGGER SWITCH REMOVED

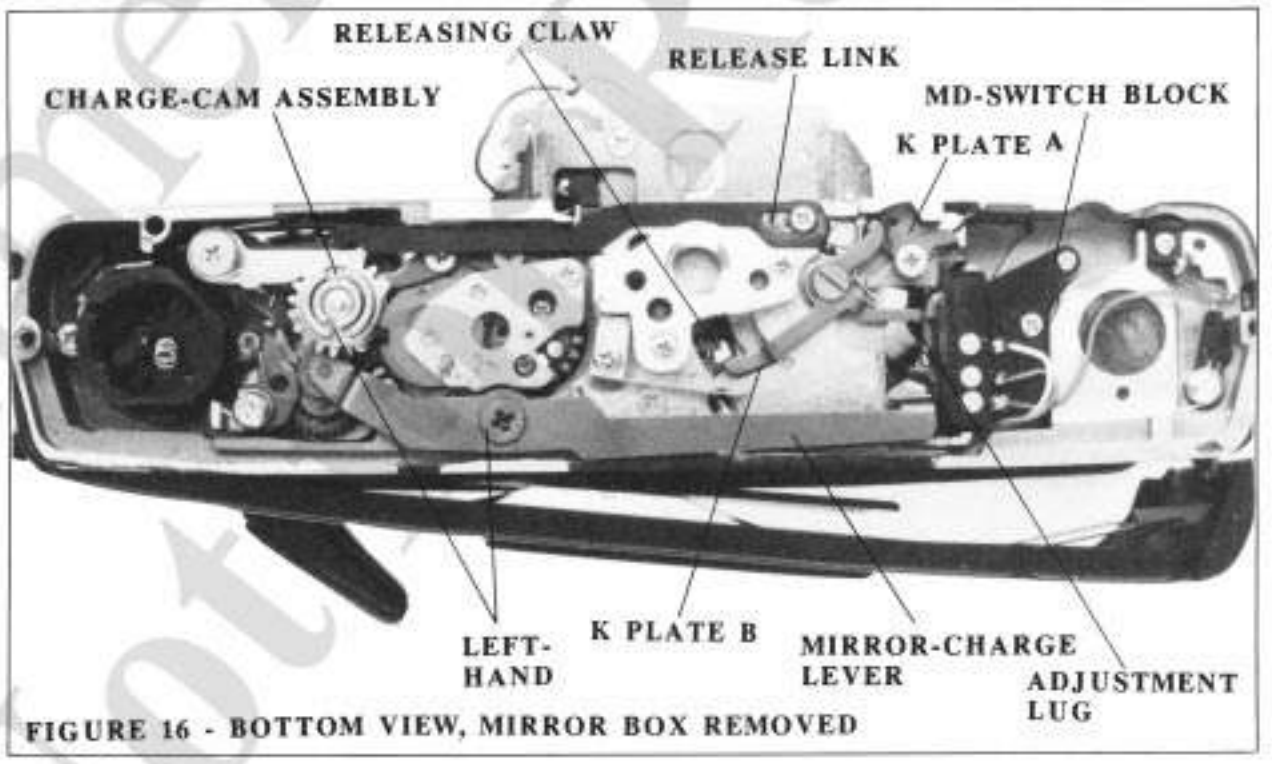

FIGURE 16 - BOTTOM VIEW, MIRROR BOX REMOVED

7. Next the mirror moves to the up position and closes the main switch. The CPU now supplies the MG1-enable signal to the I/O IC. Pin 8 of the I/O IC switches low, turning on Q201. As C201 discharges through MG1, MG1 separates and releases the 1st curtain.

8. The trigger switch opens as the 1st curtain starts to run. Pin 30 of the I/O IC switches low, signaling the CPU to start integration. Pin 34 of the CPU switches high to lock the exposure information in memory.

9. Opening the trigger switch also starts the direct metering. Pin 41 of the I/O IC switches high, opening the switch at the output of AR1 in the head amplifier. Now AR2 in the head amplifier charges the integra-

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tion capacitors according to the current through the SPD. AR3 amplifies the output and provides the integration signal to IC103.

10. On auto modes, the integration signal controls the shutter speed. The D/A converter in the CPU provides a voltage that corresponds to the film speed at one input of CP1 in the I/O IC; the integration signal provides the other CP1 input. When the integration voltage surpasses the ISO voltage, the CP1 output switches low. The low signal at pin 32 of the I/O IC switches off Q202. Q202 shuts off the current through MG2 to release the 2nd curtain.

11. On manual-speed settings, the manual-speed timer in the CPU controls CP1. When the trigger switch opens, the timer counts clock pulses. The timer ends the exposure by switching CPU pin 28 high. The high signal causes CP1 to switch I/O pin 32 low, shutting off Q202 to release the 2nd curtain.

12. The FT circuit on the FT board, Fig. 1, acts to suppress rapid BV changes during indication. Q401 conducts during indication to charge C402. When the main switch closes, Q401 switches off. BV fluctuations can then affect the exposure during direct metering.

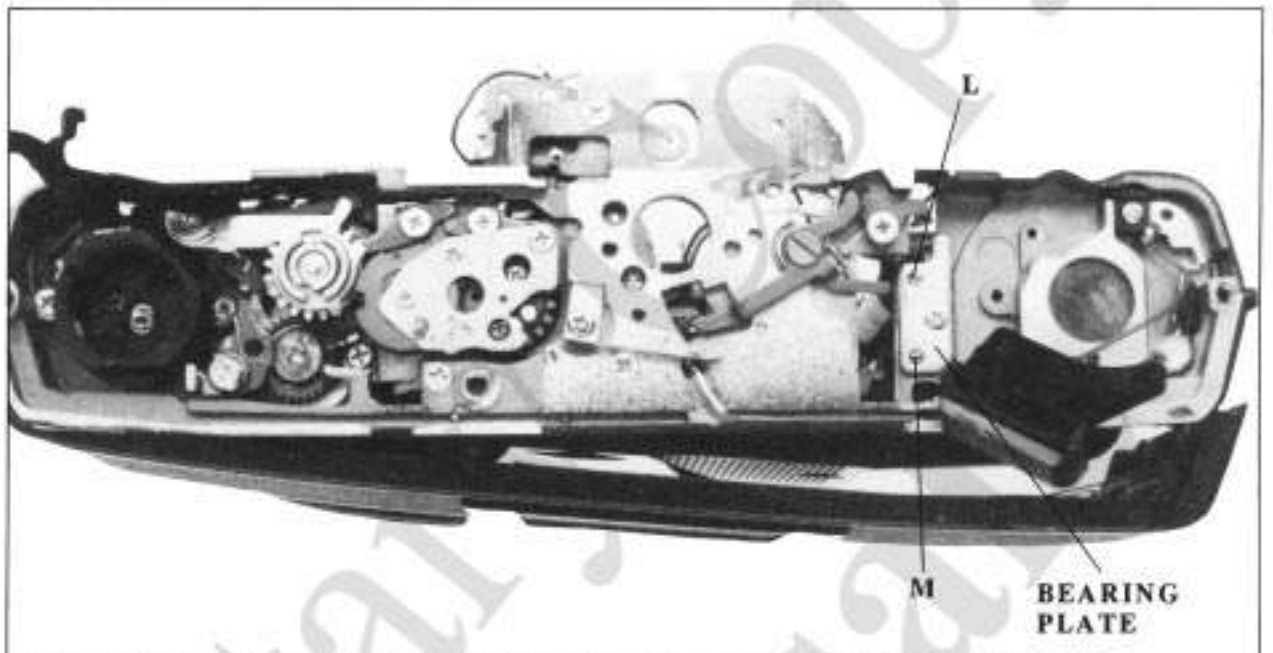

FIGURE 17 - BOTTOM VIEW, RELEASE LINK AND MD-SWITCH BLOCK REMOVED

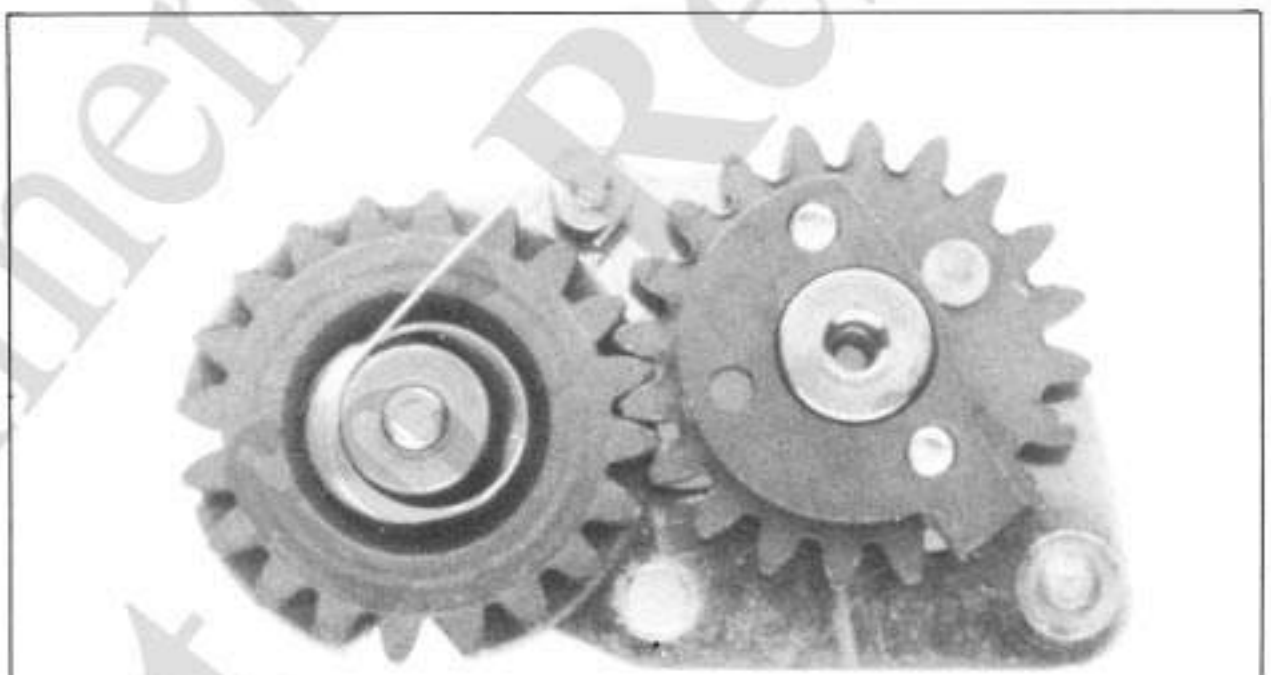

FIGURE 18 - UNDERSIDE OF TRANSPORT-GEAR UNIT

DISASSEMBLY HIGHLIGHTS

Settings for disassembly: unimportant
Locations of left-hand threads: screw holding mirror-charge lever, screw holding charge-cam assembly, Fig. 16

Sequence:

1. bottom cover (4 screws)

2. top cover

- wind lever (pry off cover, remove screw)
- wind-shaft spacer, nut, spring base (with ball detent), lever spring, lever washer
- unscrew rewind knob
- remove mode-selector lever (retaining ring)
- remove film-speed dial (cemented nameplate, screw, spring, SV plate, dial)

Note: The larger spring coils go down, toward the top cover.

- 4 top-cover screws

Note: As you lift off the top cover, the back-latch spring, the rewind button with the rewind-button spring, and the rewind-button rod will be loose. The rewind-button spring fits over the outer diameter of

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the rewind button. The rewind-button rod goes with the smaller diameter down.

3. unsolder 4 top-cover wires from main board (flex) -- pink, green, red, blue

Sequence to remove mirror box:

1. unsolder purple wire (data-back contact) from main-board flap, Fig. 23

2. unsolder all wires of ribbon connectors A and B, Fig. 23 (6 wires in ribbon A, 5 wires in ribbon B)

3. unsolder yellow LCD-lamp wire from main board, Fig. 23

4. remove 2 screws (white) holding SV board (corners by pentaprism, Fig. 4)

5. lift aside SV board, Fig. 5 (leave wires attached)

6. remove screw holding black-wire solder lug (LCD-lamp ground wire), Fig. 5

7. remove screw holding display switch, Fig. 5

8. lift out LCD-lamp/light-guide block, Fig. 5

9. remove mode selector, Fig. 1 (retaining ring)

10. lift out brass shoulder bushing (goes under mode selector, shoulder up)

11. lift mode-switch board free of rewind-shaft housing

12. lift FT circuit board, Fig. 1, free of camera body (held by double-sided tape)

13. remove cover plate, front bottom of mirror box (uncovers SW4, Fig. 2)

14. unsolder blue and white wires from SW4, Fig. 2

15. unsolder red wire from TV board, Fig. 22

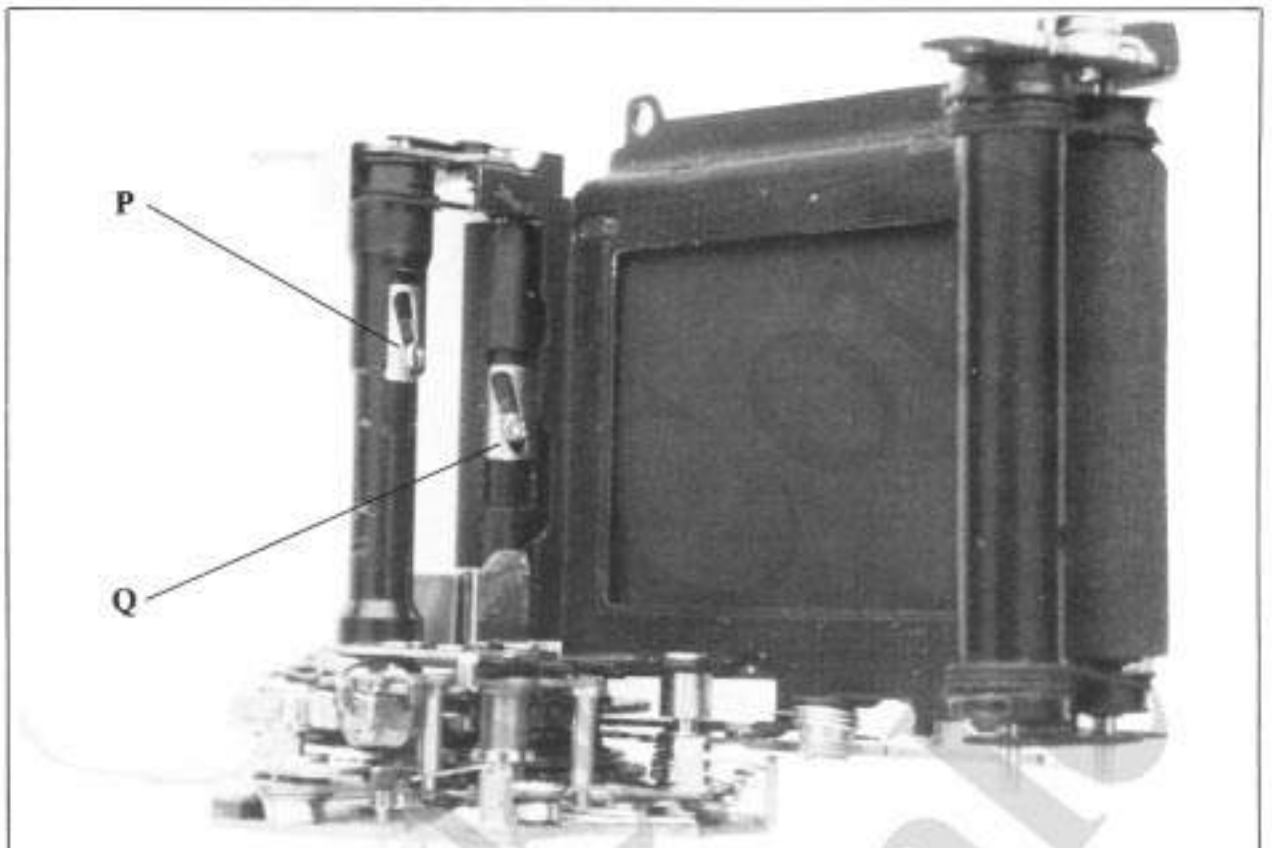

FIGURE 19 - SHUTTER BLOCK, FRONT VIEW

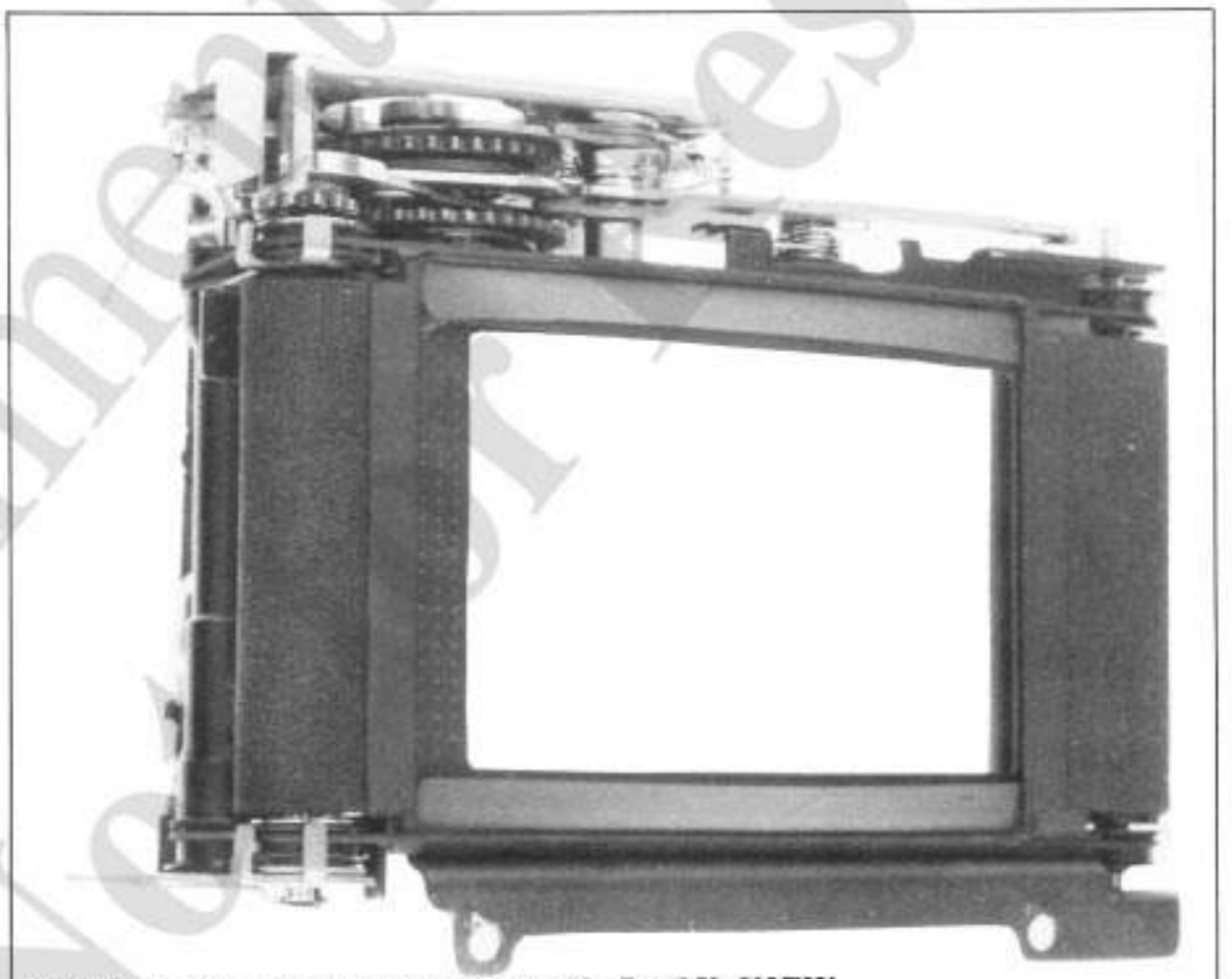

FIGURE 20 - SHUTTER BLOCK, BACK VIEW

16. remove right and left front leather

17. remove 2 white screws, top of camera (1 on each side of eyelens)

18. remove 5 front-plate screws

19. lift out front-plate/mirror-box assembly, Fig. 9

Reassembly highlights:

1. Set the shutter-speed ring on the mirror box to bulb. Also set the TV gear, Fig. 12, to bulb. At bulb, a dot on the TV gear points to the front of the camera (you can see two TV-gear dots at bulb). To quickly find bulb, first cock the shutter. Then depress the release plate and turn the TV gear until the bulb latch, Fig. 12, moves toward the shutter gears.

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2. Make sure the red wire, Fig. 10, as well as the blue and white SW4 wires, will be accessible at the front of the mirror box after reassembly.

3. Charge the shutter. The mirror box should be released with the mirror down. As you seat the mirror box, pass the shutter-release lever, Fig. 10, through the cutout in the body casting. Make sure the charge lever on the mirror box passes to the front of the curved end of the mirror-charge lever (bottom of camera, Fig. 16).

4. Hold the mirror box firmly in place and advance the wind lever to charge the mirror. Then check the release -- you should get bulb operation. If not, lift the mirror box far enough from the body casting to disengage the TV gear. Turn the TV gear until you can see both dots.

5. Tighten the front-plate screws diagonally (indicated by the sequence numbers, Fig. 2). Tighten the 2 upper mirror-box screws by the eyelens last.

6. Position the wires of ribbon B to the back of the camera. Position the wires of ribbon A to the front, Fig. 11.

7. Seat the lamp-guide unit as shown in Fig. 5. Replace the display switch.

8. Pass the ribbon A wires under the front corner of the main board, Fig. 4. Pass the ribbon B wires under the section of flex that mounts IC105, Fig. 4.

9. Replace the SV selector, Fig. 4.

10. Solder the wires to the top of the main board --

- 1 green from AV board
- 1 green from ribbon B
- 1 yellow from LCD lamp

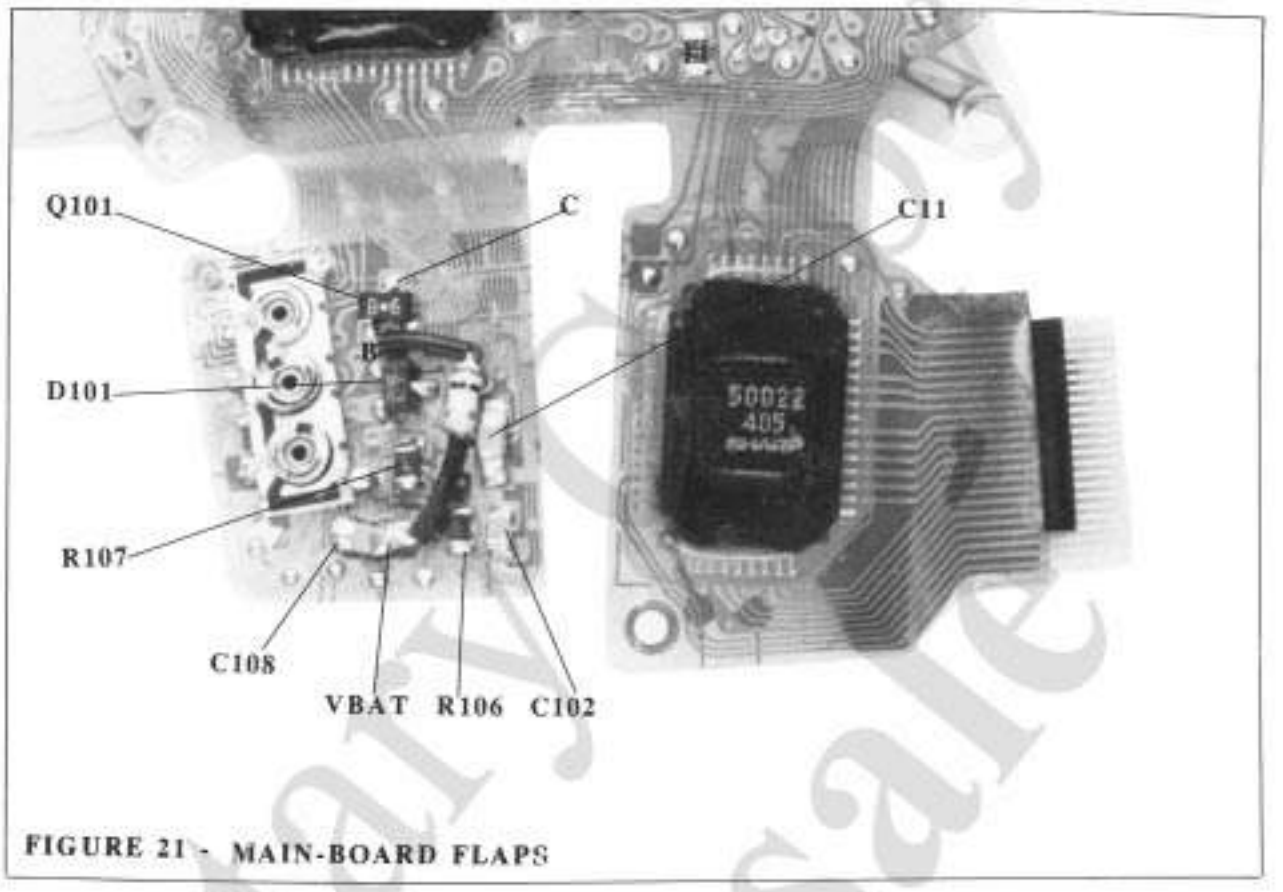

FIGURE 21 - MAIN-BOARD FLAPS

11. Solder the wires to the IC105 board, Fig. 23.

12. Replace the yellow insulator on the main board (under the main-board flap). Solder the wires to the main-board flap.

Caution: Heat the solder connections just long enough for the solder to flow. Holding on the heat too long may loosen the components on the underside of the flex section.

Sequence to remove main board:

1. unsolder remaining wires from main-board flap, Fig. 23

2. unsolder yellow and orange wires from IC105 board and green AV-board wire from top of main board, Fig. 23

3. remove 2 screws, top of main board, that hold eyelens -- remove eyelens block

4. remove flash-ready LED, Fig. 9 (1 screw)

5. loosen 2 setscrews holding LCD connector, Fig. 9 -- lift LCD connector from mirror box, Fig. 8

6. unsolder wires by self-timer switch, Fig. 9 (2 red, blue, black)

7. remove self-timer/silencer switch brush (disconnect spring, remove brass screw, Fig. 9)

8. remove screw holding main board to back of front plate, Fig. 9

9. disconnect lower end of pulley spring, Fig. 9

10. free main board from back of front plate (held by double-sided tape)

11. unsolder black main-switch wire, bottom of main board, Fig. 10

12. remove screw holding mirror-box bottom plate (screw in lower right-hand corner, Fig. 10)

13. lift out mirror-box bottom plate together with main board

14. separate main board

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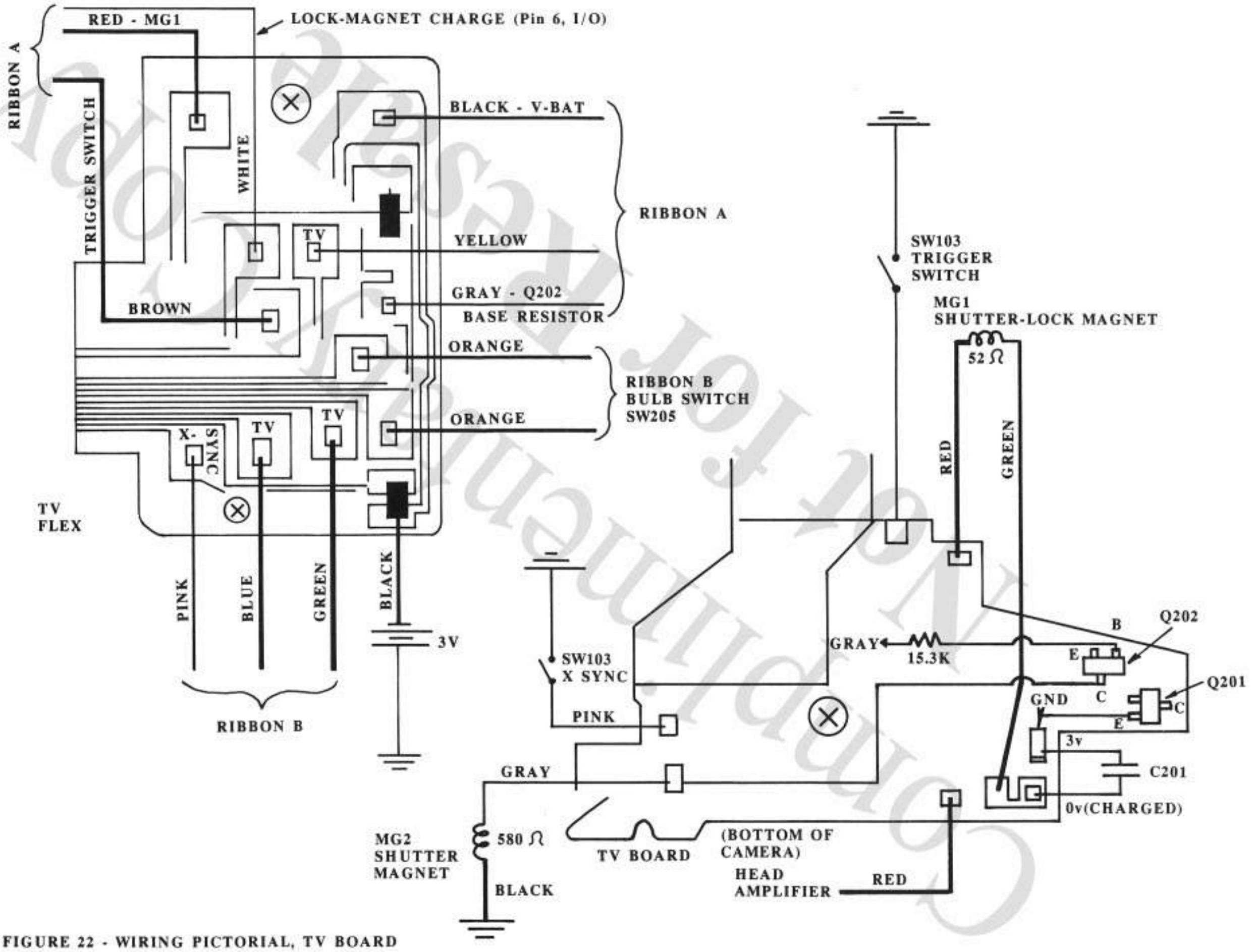

FIGURE 22 - WIRING PICTORIAL, TV BOARD

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from mirror-box bottom plate (3 screws, 2 holding clips) -- note loose blue filter between photocell lens and head amplifier; the lens is also loose

Sequence to remove TV board:

Note: If you're replacing the TV board, unsolder all the wires from the TV flex, Fig. 22. If you're just removing the TV board to reach the shutter block, it's only necessary to unsolder the black negative-battery wire.

1. unsolder wires

2. unsolder trigger-switch lead from TV board, Fig. 22

3. pull blue and white wires loose from cement on TV flex

4. remove 2 screws holding TV flex

5. remove 2 screws holding TV board

6. remove TV board and flex, passing the TV flex and wires between the curtain rollers

7. remove TV gear

Sequence to remove shutter block:

1. remove mirror box and TV board

2. remove tripod socket (2 screws)

3. remove mirror-charge lever, Fig. 16 (1 left-hand screw)

4. remove shoulder screw from release link, Fig. 16 -- lift aside link as shown in Fig. 17

5. remove spring lever, Fig. 17 (1 shoulder screw)

6. remove transport-gear unit (#4 base plate), Fig. 17 and Fig. 18

Note: The large screw for the #4 base plate goes into a threaded post. Since the post -- rather than the screw -- may come loose, unscrew the large screw last. If the post unscrews, it stays with the #4 base plate, Fig. 18. Hold the post and remove the screw. Then replace the post in the body casting.

7. remove MD-switch block, Fig. 16 (2 screws -- leave wires connected)

8. remove lower bearing plate for tension rollers (S plate), Fig. 17 (1 screw)

9. remove trigger-switch plate, Fig. 14 (2 screws)

10. remove 3 countersunk screws, bottom of body casting, that hold shutter block, Fig. 17

11. remove 3 screws at front of shutter block (mask screws), Fig. 6

12. remove 3 countersunk screws at top of shutter block (2 on wind side, 1 on rewind side)

13. advance wind lever until the charge cam, Fig. 17, clears the bottom of the shutter block

14. hold the release latch (S lever), Fig. 15, against its spring tension (toward the shutter-lock magnet) and lift shutter slightly

Note: You can reach the release latch through the cutout at the bottom of the body casting, Fig. 17.

15. pull bottom of shutter block slightly toward the front of the body casting until the mirror-return lever, Fig. 20, clears the lip at the bottom of the body casting

16. lift out shutter block toward top of body casting, Fig. 19

Note: Push up the shutter block from under the wind gears while you're moving the mirror-return lever, Fig. 20. Shift the shutter block slightly to the right and to the left until the levers clear.

Reassembly highlights:

1. Turn the wind lever until the charge cam clears the large cutout at the bottom of the body casting.

2. Seat the shutter block from the top of the body casting. Make sure the purple wire passes through the slot between the screw holes at the top of the shutter block.

3. Seat the wind-gear side of the shutter block first. Then manipulate the mirror-return lever until it clears the body-casting lip. The shutter block will drop down until it's blocked by the release latch (S1 lever), Fig. 15. Move the release latch toward the shutter-lock magnet until the shutter block seats fully.

4. The reset lever, Fig. 15, disconnects the release latch for the mechanical settings and the reset operation. Connect the short end of the reset spring against the tab at the underside of the reset lever. Connect the long end of the reset spring to the edge of the body-casting hole, Fig. 15.

5. Replace the 3 countersunk shutter-block screws at the bottom of the body casting.

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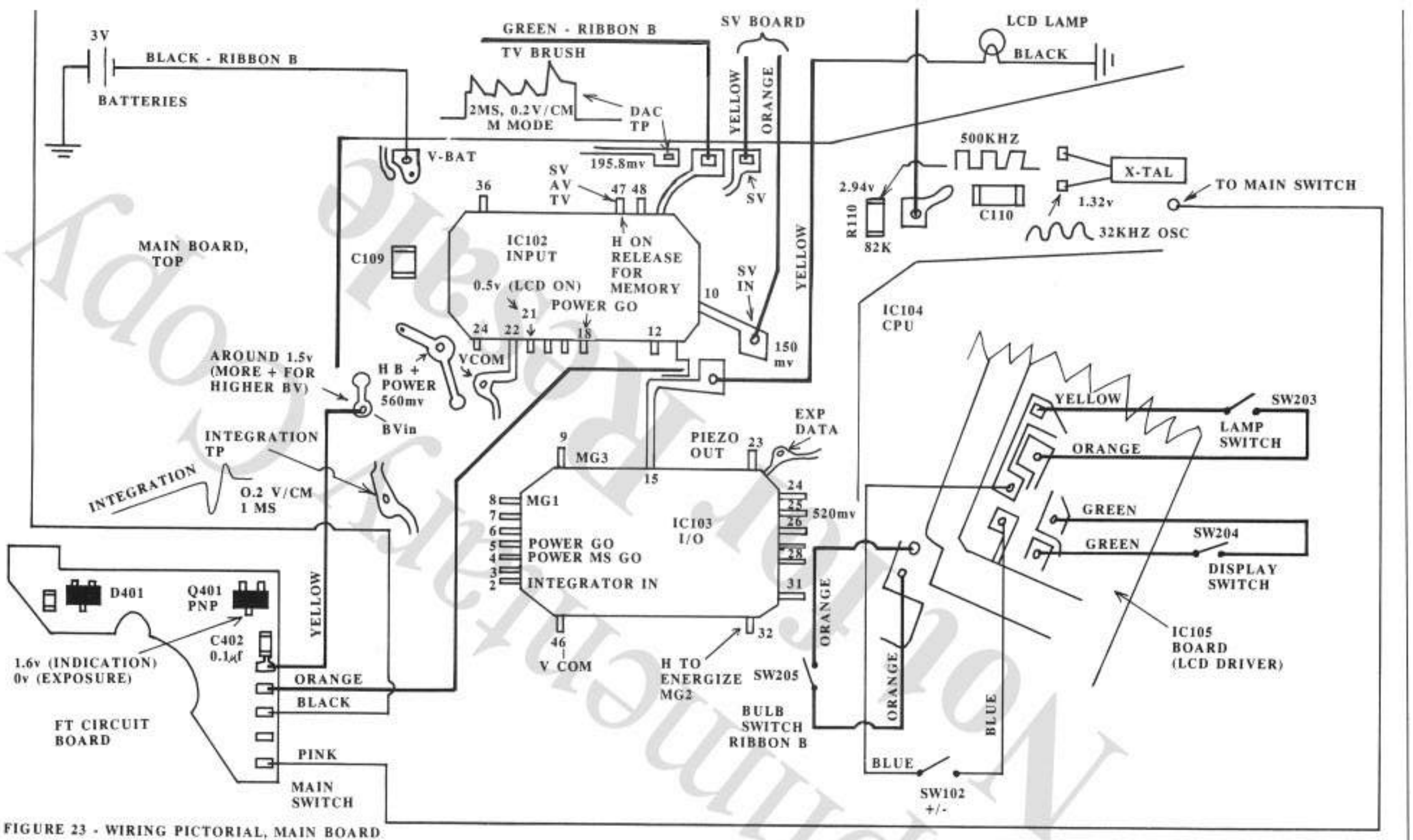

FIGURE 23 - WIRING PICTORIAL, MAIN BOARD

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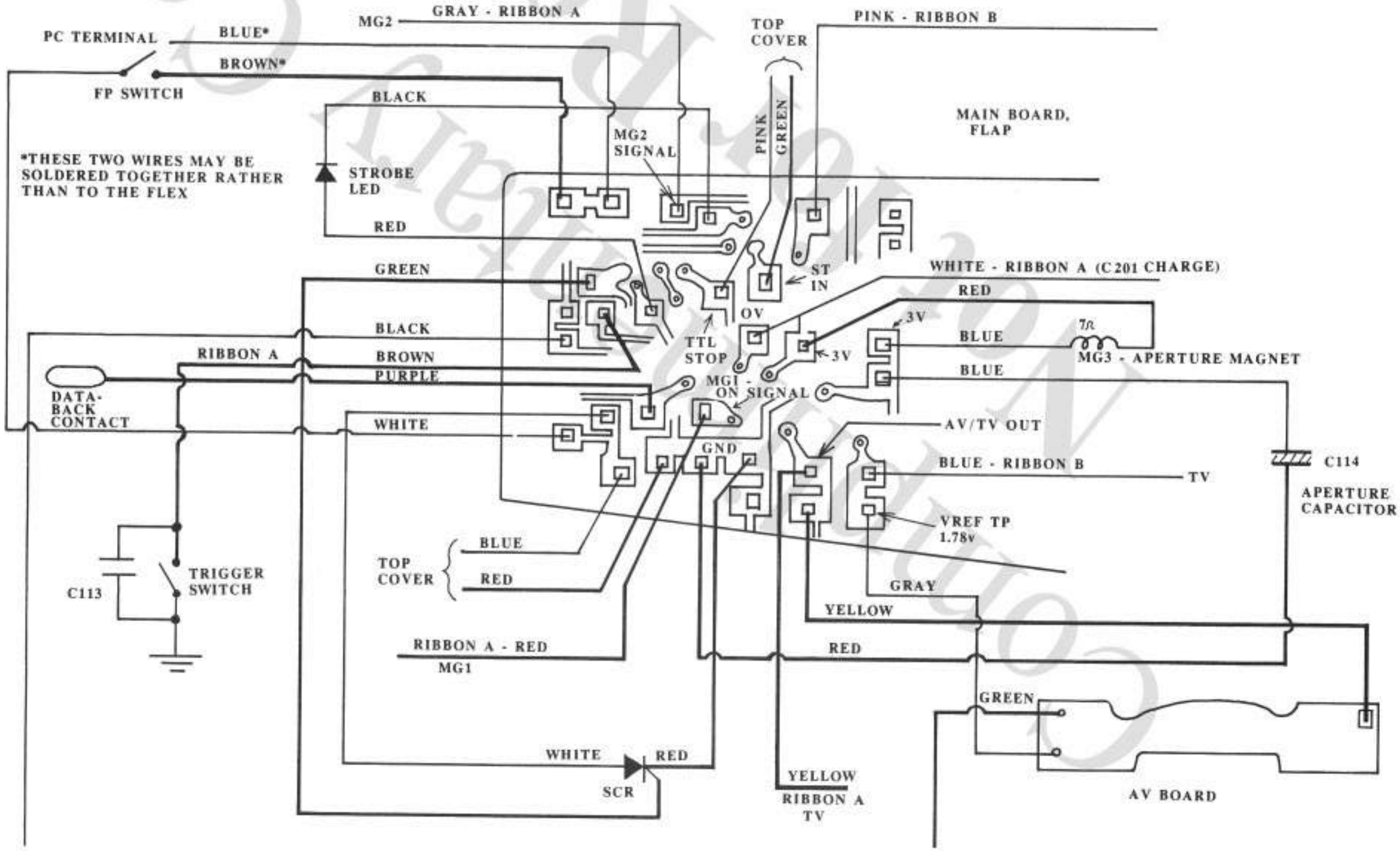

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6. Replace the bearing plate for the tension rollers, Fig. 17

7. Replace the 3 mask screws at the front of the shutter block.

8. Replace the 3 countersunk screws at the top of the shutter block.

9. Hold the latch-disengaging lever, Fig. 16, against its spring tension. Then advance the wind lever to the latched position.

10. Charge the shutter curtains by turning the 1st-curtain gear ccw to the latched position (turn the 1st-curtain gear from the bottom of the camera).

11. If you've disassembled the transport-gear unit, reassemble the gears and spring as shown in Fig. 18. Seat the transport-gear unit and replace the 3 screws.

12. Replace the spring lever, Fig. 17.

13. Seat the release link, Fig. 16. Make sure the tab at the end of the release link fits within the fork of the mirror-release lever, Fig. 15. Fit the brass pin of the magnet lever against the release-link tab as shown in Fig. 16. Replace the release-link shoulder screw.

TROUBLESHOOTING

Behavior without batteries: mirror locks up except at mechanical speeds

Typical current draw:

standby -- 12 microamps or less
LCD on -- 0.5ma
LCD lamp on -- 7ma
Battery check (with beeper) -- 8ma

Frequently repaired sections:

1. Mirror fails to rise, mechanical or electronic settings, because of a dirty or binding mirror governor, Fig. 10. It may be necessary to replace the governor assembly -- MD switch assembly ZJ192200.

2. Erratic auto exposure or meter readings. You can usually correct by cleaning the SV board, Fig. 4, and the film-speed selector.

3. Erratic high speeds or no exposure. Clean the shutter magnet MG2 (see, "Repair shortcuts"). Also check the operation of the 1st-curtain release lever (K plate B), Fig. 16. Check with the mirror box installed. After you cock the shutter, K plate B should latch on the highest step of K plate A. There should now be a space gap of at least 0.2mm between the end of K plate B and the releasing claw (visible through the body cutout, Fig. 16). If you have to increase the space gap, bend the adjustment lug on K plate B.

Techniques for voltage measurements:

1. Make voltage measurements with respect to the black V-bat wires, Fig. 23 (negative). Voltages are then positive with respect to the black wire. All test voltages are negative with respect to body ground.

2. With the early main board, you can reach IC pins for voltage tests. However, the pins are covered with silicone moisture-proofing. To check pin signals, use a needle-point probe to poke through the silicone. The revised main board doesn't allow access to the IC pins. Not all of the test points mentioned in the troubleshooting are then available.

Repair shortcuts:

1. To clean the shutter magnet MG2 (erratic shutter speeds, fast speeds too slow, shutter hangs open), remove the lens and the cover plate at the front (bottom) of the mirror box. You can then reach the shutter magnet, Fig. 12, for cleaning.

2. To clean the aperture magnet MG3 (erratic apertures on program, aperture on program too small), remove the top cover. Then lift aside the section of flex that has the 2 variable resistors, Fig. 3. Remove the cemented aperture-magnet cover to clean the magnet interface.

Scope tests, main board:

Note: IC failures require replacing the complete main board M2. Because of the part cost, and the time required to replace the main board, you may prefer to send such repairs to the factory. The following tests may detect a main-board failure:

1. 32KHz oscillator

Check at the lead of the quartz crystal indicated in Fig. 23. You should get the 32KHz sine wave as soon as you apply power to the circuit. No signal indicates a defective quartz crystal or a defective CPU.

2. Clock

Check at the end of R110 indicated in Fig. 23. With the LCD off, the clock is in the standby mode for energy conservation. The 500KHz square wave then pulses on and off at a rate of 300ms.

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You may have to adjust the scope's trigger control to see the pulsing square wave. Next push the release plate part way to close the display switch -- the clock signal should now appear steady. When the display switch opens, the clock signal should again pulse -- this time at a faster rate of 100ms. If you set the battery-test mode or if you close the main switch (mirror up), the clock signal should again stop pulsing. After the display switch has been open 2 minutes, the clock should return to the standby mode (pulsing at a rate of 300ms) and the LCD should turn off. A failure of the clock signal indicates a defective CPU.

3. Digital-to-analog converter

Check at the DAC TP, Fig. 23. You should get the signal shown when you close the display switch (manual mode). If not, either the CPU or the input IC may be defective.

4. BV

Check at the BV TP, Fig. 23, using either a scope or a voltmeter. You should get a changing analog voltage according to light level when you close the display switch (more + for higher BV). If not, the head amplifier may be defective.

5. Integrator-in

Check at the integration TP, Fig. 23, as you release the shutter at an auto setting. You should get a trace similar to that shown in the pictorial. If not, the head amplifier may be defective.

Troubleshooting steps for specific problems:

1. Mirror locks up, no LCDs, no battery test

Battery voltage to circuit
Check for 3V between the black V-bat wire, Fig. 23, and the red ground wire (main-board flap, Fig. 23). No voltage -- battery box or wiring.

Reference voltage
Check for Vref at the test point, Fig. 23 (gray wire). No voltage -- variable resistor H, poor wiper contact, C108 shorted, Fig. 21, or IC102 defective. A voltage higher than 1.8V may indicate improper adjustment of Vref or a defective IC102.

Clock signals
Check for the 32KHz sine-wave signal at the crystal lead, Fig. 23; the signal should be present whenever power is supplied. No signal -- C115, crystal, or IC104 defective (replace the main board). Check for the 500KHz CPU clock signal at the end of R110, Fig. 23 (square wave). You should get a pulsating signal until you close the display switch; you should then get a steady square-wave signal. No signal -- R110 or IC104 defective.

2. Mirror locks up, LCDs and battery test o.k.

Q201, MG1, C201
With the mirror locked up, short the red MG1 wire (main-board flap, Fig. 23) to the Vref TP (gray wire, Fig. 23). If the shutter then releases, Q201, MG1, and C201 are o.k. Or, with the mirror down, short the red MG1 wire to the Vref TP -- you should hear a "click" as the shutter-lock magnet MG1 separates. When you then push the release, the shutter should operate. No click -- check MG1 (open coil, dirty interface), Fig. 12, and C201, Fig. 21 (open, shorted, poor solder).

Main switch
Check at the pink wire to the main board, Fig. 23. With the mirror down, you should measure 0V (- 3V with respect to body ground). With the mirror up, you should measure 3V (0V with respect to body ground). Alternately, check with an ohmmeter -- you should measure direct continuity to body ground with the mirror up. If not, check the main switch, Fig. 10, for poor contact and the pink wire for poor solder.

Note: The problem can also be caused by chattering in the main switch. Check with a scope. The trace at the pink wire should switch low when you release the shutter (the voltage stays high if the mirror locks up). A ragged trace indicates chattering.

IC103
Check the signal at the red MG1 wire (main-board flap, Fig. 23) as you release the shutter. The voltage should switch low. If not, IC103 may be defective.

3. Shutter stays open

Note: Check the following if the shutter hangs open in all electronic modes (manual and auto). If the shutter hangs open only in the auto modes, the main board may be defective (integration signal). You can check the integration signal at the integration TP, Fig. 23; you should get the signal shown when you release the shutter (the actual shape varies with BV).

Trigger switch
Check at the trigger-switch TP (brown wire, main-board flap, Fig. 23). With the shutter cocked, you should

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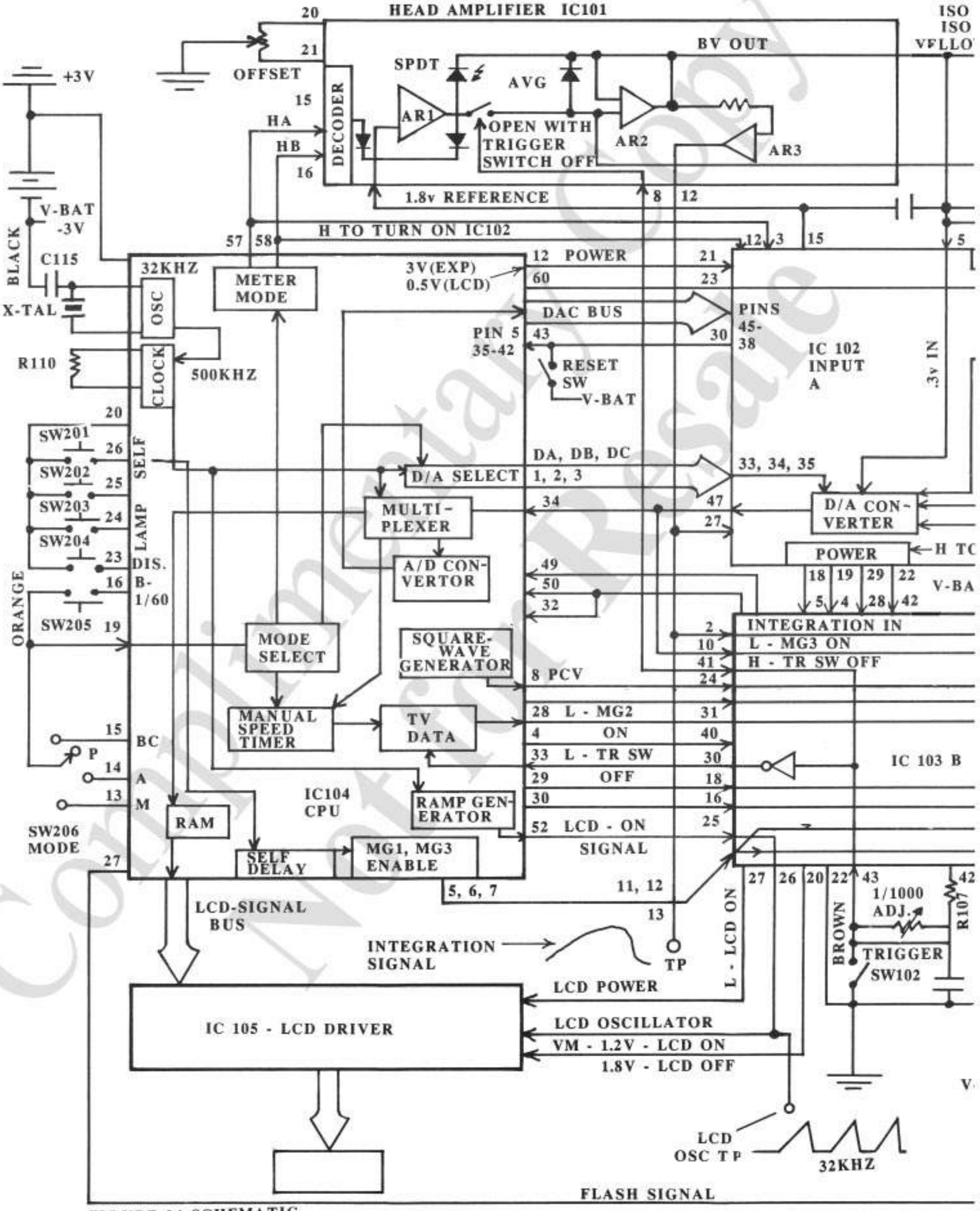

FIGURE 24 SCHEMATIC

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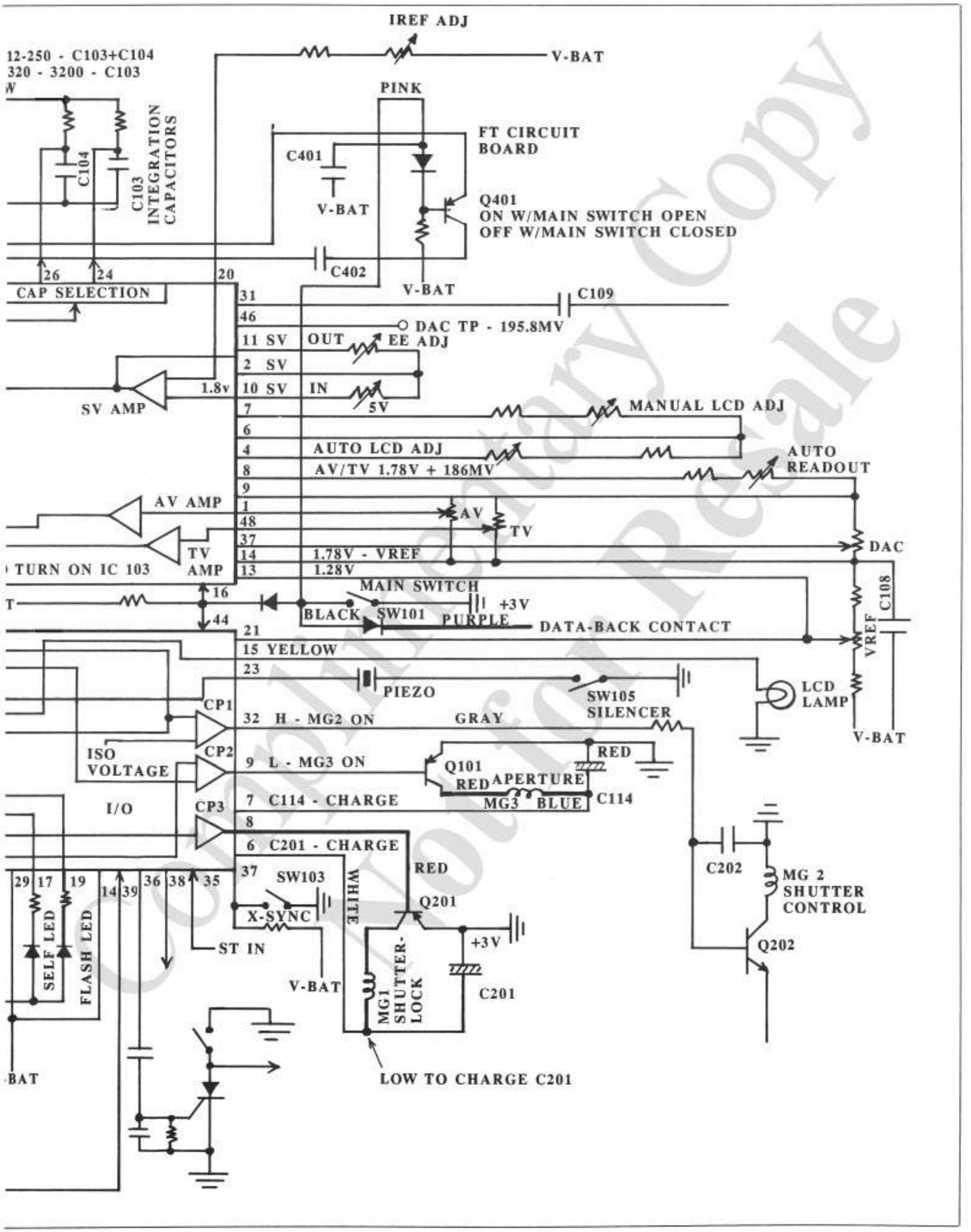

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measure 3V (0V with respect to body ground). With the shutter open, you should measure 0V. If you measure 3V with the shutter open, check the trigger switch by disconnecting the brown wire. Then check the continuity between the brown wire and body ground. Proper operation -- no continuity with the shutter open, direct continuity with the shutter cocked. If you measure direct continuity with the 1st curtain released, the trigger switch isn't opening or C113, Fig. 8, is shorted.

RV104, R107
With the shutter held open electronically, short the trigger-switch TP (brown wire, main-board flap, Fig. 23) to the black Vbat wire at the main-board flap. If the shutter then closes, the problem may be poor solder to R107, Fig. 7, or poor wiper contact to RV104 (A in Fig. 2). You can check RV104 and R107 by measuring the resistance between pins 42 and 43 of IC103, Fig. 23. You should measure around 100K, depending on the setting of RV104.

Q202
With the shutter open, short the MG2 TP (gray wire, main-board flap, Fig. 23) to the black Vbat wire at the main-board flap. The shutter should close. If not, Q202, Fig. 21, may be shorted.

Note: If the problem occured only after reassembly, check for reversed gray wires at the main-board flap, Fig. 23. Also, soldering the wires to the main-board flap may have disturbed the R107 solder connections.

4. Diaphragm always stops down fully on program

Aperture magnet MG3
Cock the shutter. Then short the red MG3 wire (main-board flap, Fig. 23) to body ground. You should hear a "click" as the aperture magnet repels its armature. When you then release the shutter, the diaphragm should remain fully open. No click -- MG3 defective or dirty interface.

Q101, C114
Cock the shutter. Then short pin 9 of IC103 to the black Vbat wire, Fig. 23. You should hear a "click" as the aperture magnet repels its armature. No click -- Q101, Fig. 21, or C114, Fig. 23, open or poor solder. Also check the C114 wires (blue and red), Fig. 23.

Note: Depending on the main board, the IC103 pins may not be accessible. You can then make the tests at the leads of Q101 on the underside of the flap, Fig. 21.

IC103
Check the signal at pin 9 as you release the shutter. The signal should pulse low (the low signal turns on Q101). No pulse -- IC103 defective.

5. Shutter delivers no exposure (curtains cross aperture together)

1st-curtain release
If the curtains cross the aperture together on mechanical operation as well as electronic operation, check the 1st-curtain release ("Frequently repaired sections, #3) and the mirror-charge lever, Fig. 16. The 1st-curtain latch may not be engaging the 1st-curtain gear (insufficient wind overtravel, insufficient space gap between K plate B and releasing claw, Fig. 16).

MG2, Q202, R202
Short the MG2-signal connection (gray wire, main-board flap, Fig. 23) to body ground as you release the shutter -- the shutter should stay open as long as you hold the short. If not, check MG2, Fig. 12, for an open coil or dirty interface. If MG2 is o.k., the problem may be an open R202 or Q202, Fig. 22.

IC103
Check at the MG2-signal land (gray wire, Fig. 23). You should measure 0V. When you release the shutter, the signal should switch high (around 2.4V to turn on Q202). If not, IC103 may be defective.

6. No change in manual speeds (fast speed only, all manual-speed settings), manual LCD indication reads low (below index)

TV resistor
Check the voltage at the green wire (TV brush) at the top of the main board, Fig. 23. The voltage should change as you change the manual speeds (lower voltage at faster-speed settings). Or disconnect the green wire and measure the resistance between the green wire and the blue TV wire at the main-board flap, Fig. 23. Approximate resistance values:

1 second -- 18.8K
1/15 -- 11.6K
1/60 -- 8K
1/500 -- 2.7K

No change or high readings -- clean the TV resistor (under TV gear, Fig. 12.

7. Shutter delivers only 1 second at manual settings

TV resistor connections
Check for Vref at the blue TV wire, Fig. 23. Check the blue-wire solder connections.

8. LCD inoperative, other

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functions o.k.

Note: If just certain segments are missing, check as described in step 9. If none of the LCD segments will turn on, check as follows:

IC103
Loosen the 2 setscrews holding the LCD-flex connector, Fig. 9 (mirror box doesn't have to be removed). Lift out the LCD-flex connector to uncover the test points, Fig. 8. Use a needle-point probe to poke through the insulation.

- LCD power -- low with LCD on
- VM -- 1.2V LCD on, 1.8V LCD off
- LCD oscillator -- osc signal

If you're not getting the LCD signals with the display switch closed, check the display switch for poor contact by shorting between the 2 green SW204 wires. Still no signals -- IC103 or CPU defective.

LCD pressure contact
Clean the LCD-flex contacts, Fig. 8, and the rubber conductor for the LCD (the flex contacts come against the rubber conductor). Then slip the LCD-flex connector into place (between the pressure bar and the rubber conductor). Try adjusting the LCD position to see if any of the LCDs will turn on.

9. LCD segments missing, other operation o.k.

Poor contact, LCD connector
To check, connect a hook-up wire to the LCD test point, Fig. 8 (you can reach the test point without unfolding the flex). Connect the hook-up wire to the Vbat land, Fig. 23. Then turn the mode selector toward the battery-test position. Just before the mode selector reaches BC, it closes the reset switch. All the LCD segments should now turn on; the segments should stay on when you move the mode selector to other settings (as long as the test point connects to Vbat). If any segments are missing, loosen the 2 setscrews holding the LCD connector, Fig. 9. Lift the LCD connector from the LCD, Fig. 8, to clean the flex contacts.

10. No change in LCD or auto speeds as you change diaphragm settings

AV resistor
Disconnect the green AV-brush wire from the main board, Fig. 23. Measure the resistance between the green wire and the gray AV wire (main-board flap, Fig. 23). Typical values:

f/16 -- 3.4K
f/8 -- 8K

OTHER COMMENTS

1. Because of the price of the main board and the time involved in folding and fitting the flex, some consider main-board replacement uneconomical and send the repair to the factory. Main board -- ZC486900

2. Other part numbers:

top cover -- ZC476900
leather, wind side -- CE833200
leather, rewind side -- CE558300
focusing screen -- CB158700
mirror governor -- ZJ183500
LCD lamp assembly -- ZC480600
shutter magnet -- ZJ175600
shutter-lock magnet -- ZJ178500
wind-lever cover -- CE594000
cover plate, film-speed dial -- CE841000
transport-gear unit -- ZJ175300
spring, transport-gear unit (Fig. 18) -- CA885100
rewind knob -- CE841500
rewind-knob pin (for crank) -- CA873000
rewind crank -- ZJ184300
rewind-crank flat spring -- ZC511700

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